Memory & attention bias in bipolar disorder: Development & validation of an internal states word list

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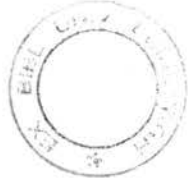

DECLARATION

I declare that I am the sole author of this thesis and the work contained herein is my own. This thesis, or any part of it, has not been submitted for any other degree or professional qualification.

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ABSTRACT

Background

Research on psychological factors related to bipolar disorder has only emerged in the last two decades or so, building on traditional conceptualisations of the disorder as a biological illness. Over time, it has become increasingly recognised that biological theories alone are unable to explain this disorder fully. Various psychological theories have begun to emerge with some empirical evidence to test these. The main objective of this study is to develop research materials to be used in future investigations for testing hypotheses inferred from Mansell *et al.* (2007) integrative cognitive psychological model for bipolar disorder.

To date, research has focused mainly on exploring cognitive styles in bipolar disorder using self-report measures. The development of the material in this study is considered for use in exploring cognitive styles in bipolar disorder using the more experimental methodology to investigate information–processing biases related to internal states.

Design/Method

The study used a cross-sectional design based on a student sample recruited from the University of Edinburgh.

A list of 36 internal state words were selected and matched with 36 neutral words, for length and frequency of occurrence in the English language (according to Leech *et al.,* 2001; Thorndike & Lorge, 1944)

A sample of 86 students from the university of Edinburgh were asked to rate the list of 72 words on a 7 point likert-type scale for level relating to internal state, emotional state and self-relevance (e.g. not at all internal to extremely internal). Participants also completed three standardised measures assessing, depression, mania/hypomania and anxiety.

Results

Data was analysed using SPSS 16.0 for windows. Descriptive statistics identified 10 words meeting criteria for highly internal, low emotional matched with 10 neutral words, meeting criteria for low ratings on internal and emotional scales. An additional list of 14 internal-emotional words were generated also matched with neutral words meeting specified criteria. Self-relevance ratings for these words were correlated using a series of correlational analysis (Spearman's rho) with scores on the standardised measures. Significant results were observed between most of the words and measures of mania/hypomania and depression, for internal and neutral words.

Conclusions

Primary findings support the development of a list of highly internal, not confounded by emotion, words, matched with neutral words for use in future research. Using self-relevance ratings to carry out preliminary investigation of the validity of these

words and preliminary investigate hypotheses inferred from Mansell *et al.* (2007) model, show inconclusive results. The clinical and theoretical implications of the study and particularly the use of this developed material for use in future research are discussed.

CHAPTER 1: INTRODUCTION

1.1 Overview

This study aims to develop material for future exploration of cognitive vulnerabilities in bipolar disorder. This introductory chapter will set out the theoretical and analytical context underpinning this investigation. It begins with an overview of the nature and history of bipolar disorder, followed by a literature review of the main theoretical approaches applied to the study of bipolar disorder and key findings. A final section sets out the analytical model and research questions underpinning this investigation.

1.2 What is manic-depressive illness (bipolar disorder)?

The main feature of bipolar disorder is a disturbance of mood, typically involving oscillation between two different mood states, mania and depression. In mania, key features include elated or irritable mood along with symptoms of overactivity, changes in personality characteristics or typical behaviour (e.g. disinhibited behaviour, grandiosity) (American Psychiatric Association [APA], 2000). In depression, the key symptoms are depressed mood and loss of interest and/or pleasure, alongside other symptoms (e.g. changes in sleep/eating patterns), cognitions (concentration, self-blame) and suicidal ideation. Psychotic type symptoms may also be observed in manic or depressive phases.

Individuals diagnosed with bipolar disorder often suffer cyclical symptoms and multiple episodes over the course of their life. The typical age of onset is usually in the early 20's, with most individuals presenting significant symptoms by the age of 25 (Evans, 2000). However, it is acknowledged that some early signs such as fluctuations of emotions (labile affect) are likely to present before the age of 20 (Goodwin & Jamison, 2007).

1.3 Classification

1.3.1 Historical context

The concept of bipolar disorder continues to evolve and stimulate debate within the academic literature. Early references to the clinical features of bipolar disorder can be traced back to the 2nd century AD in works of the famous Greek physician, Aretaeus of Cappadocia (Marneros, 2001). From clinical observations, he described numerous manifestations of affective states, considered temperamental influences and oscillations and/or transformations of the illness (Akiskal, 1996). Both states were not distinguished as distinct illnesses, but seen to lie on a continuum with melancholia (Marneros, 2001).

These observations were lost in history for some time and it was not until the mid 19th century that fresh interest in the study of bipolar disorder emerged. Falret and Baillarger (as cited in Akiskal, 1996) set out to explore whether mania and depression were in fact one and the same illness. Working independently, Falret described circular madness ('La Folie Circulaire'), while Billarger suggested that mania and depression were different stages of the same illness ('La Folie a Double

Forme'). Soon after, other scholars identified milder forms of mania (hypomania), described as a feature within 'circular disorders' (cyclothymia), not resulting in dementia, as was thought to be the case with mania or melancholia (Goodwin & Jamison, 2007).

The contributions of Falret and Baillarger paved the way for what have been considered the most influential descriptions and understanding of bipolar disorder by Emil Kraepelin (1899; 1921). Describing different affective states under the term manic-depressive illness, he viewed the illness as a single morbid process covering manic, mixed and depressive states (Maj *et al.,* 2002). Kraepelin also separated the two major psychotic illnesses, manic-depressive insanity and dementia praecox (schizophrenia). Kraepelin's explanation of manic-depressive illness was underpinned by a medical (disease) model, but he was also one of the first to report the potential role of psychological stress precipitating the illness.

This work stimulated interest in others and although a medical model for explaining the illness dominated the literature for some time (particularly in Europe), other ideas influenced by psychoanalytic thinking began to emerge in other parts of the world. The work of Meyer played a major role in developing a more psychological orientation to the study of manic-depressive illness, by considering the relative contribution of psychological, biological and environmental factors in understanding this illness (Goodwin & Jamison, 2007). These ideas soon spread to Europe, where it became increasingly evident that biological explanations alone could not account for the aetiology and course of this disorder. At this stage, manic-depressive illness still

encapsulated all mood disorders and was considered as distinct from dementia praecox.

Although Kraepelin's ideas dominated the literature for some time, a small group opposed his ideas. Findings by Bleuler (cited in Goodwin & Jamison, 2007) offered new insights into the possibility of manic-depression living on a continuum with dementia praecox, stimulating new debate and further research. His broader conceptualisation of manic-depressive illness, divided its different manifestations under the category of affective disorders, thus distinguishing between unipolar and bipolar depression. This early distinction was further supported by the work of Leonhard (1957), which, as well as considering the role of familial and historical context, identified sub-categories to account for the presence of both mania and depression and the absence of one or the other.

1.3.2 Current Classification

Regardless of these developments, Kraepelin's ideas continued to dominate until the 1960's. Large scale studies by Angst (1966) and Perris (1966) and later findings by Winokur and Clayton (1967) provided further support to the arguments of Leonhard and others. Namely, that unipolar depression and bipolar disorder were two different entities and could be differentiated by a patient's clinical presentation, course, family history and therapeutic response (National Institute for Health and Clinical Excellence, 2006). Although, others argue that conceptualising bipolar and unipolar disorders as different entities was a mistake and not reflective of research findings at that time (Akiskal, 1996). This body of work has influenced modern

conceptualisations of mood disorders and has been incorporated into the Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised (DSM-III-R), the more recent Fourth Edition (DSM-IV) (American Psychiatric Association, 1987, 1994) and the International Statistical Classification of Diseases and Related Health Problems, 10th revision (ICD-10) (World Health Organisation, 1992).

The DSM-IV criteria have been criticised for distinguishing bipolar disorder from all forms of major depression, ignoring the relationship between bipolar disorder and the more highly recurrent forms of unipolar depression (Goodwin & Jamison, 2007). It is suggested that current classification in its narrow conceptualisation, increases the likelihood of under diagnosis and exclusion of possible bipolar disorder cases from research (Angst *et al.*, 2003; Angst, 2007). Furthermore, Angst argues that research findings increasingly support a spectrum approach, drawing on comparisons with schizophrenia. In his view, the concept should be broadened to encompass a wider perspective of bipolar disorder and to offer an alternative to the schizophrenia vs. manic-depressive illness and unipolar vs. bipolar dichotomies. Angst (2007, p190) suggested that epidemiological and clinical studies show "continuous distribution of depressive and hypomanic manic syndrome from normal to pathological". Similarly, the work of Akiskal and colleagues (e.g. Akiskal *et al.*, 2000; Akiskal & Mallaya, 1987; Akiskal & Pinto, 1999;) has been amongst the most advanced in calling for the use of a broadly defined bipolar spectrum, conceptualising bipolar disorders on a continuum with unipolar and including 'softer presentations' (e.g. less than hypomanic).

1.3.3 The broader clinical spectrum of bipolar disorders

Broadening the bipolar disorder concept beyond current classification systems has been an ongoing debate for some time and is increasingly supported in the literature. The spectrum approach considers a continuum between bipolar and unipolar disorders and is also proposed as a way to conceptualise the relationship between the severe end of the spectrum (e.g. full blown mania and depression) and the milder characteristics observed more frequently in clinical and non-clinical populations (e.g. temperament) (Goodwin & Jamison, 2007).

The idea of a spectrum is not new. In the early 80's, Klerman (1981) described a spectrum of manic conditions from classic psychotic mania to various degrees of hypomania and later, Endicott (1989) extended the bipolar spectrum to include cyclic depressions, without clear-cut hypomania (Akiskal *et al.*, 2000).

Akiskal and colleagues suggest a range of bipolar types subsumed within the spectrum (Table 1.1) on the basis of clinical observations and research evidence, especially relating to pre-morbid temperaments (cyclothymic and hyperthymic traits); association with familial bipolarity; and hypomanic presentations that may occur during or after pharmacotherapy or other somatic treatments (e.g. Akiskal & Mallya, 1987; Akiskal & Pinto, 1999).

Table 1.1 **The evolving spectrum of bipolar disorders**

Type	Description
Bipolar 1/2	Schizobipolar disorder
Bipolar I	Manic-depressive illness
Bipolar I 1/2	Depression with protracted hypomania
Bipolar II	Depression with spontaneous hypomanic episodes
Bipolar II 1/2	Depression superimposed on cyclothymic temperament
Bipolar III	Recurrent depression, plus hypomania occurring solely in association with antidepressant or other somatotherapy
Bipolar III 1/2	Mood swings that persist beyond stimulant and/or alcohol abuse
Bipolar IV	Depression superimposed on a hyperthymic temperament

Source: see Akiskal and Pinto (1999).

Akiskal (1996) describes a greater complexity and variability of the bipolar and unipolar disorders, arguing that they cannot be so easily separated and that research evidence shows transitions between the two disorders over the clinical course of the illness. In addition, he points to findings of high-risk bipolar transformation (e.g. from dysthymic to hypomanic) and clinical prevalence of softer bipolar presentation (e.g. bipolar II) in recurrent depression. Furthermore, prospective studies have shown evidence that patients with major depressive disorder with a definite family history of loaded pedigrees are at high risk of bipolar I transformation (Akiskal *et al.,* 2000).

Although DSM-IV recognises the softer presentation of bipolar disorder (e.g. bipolar II), Akiskal and colleagues argue that even more subtle forms of hypomania

occurring as part of cyclothymic or hyperthymic temperament have been observed. Considering temperament associated with sub-threshold expression of bipolarity, Akiskal *et al.* (1977) and Placidi *et al.* (1998) report evidence of cyclothymic temperaments in student samples being associated with risk of developing affective disorders (Akiskal *et al.,* 2000). Likewise, Depue *et al.* (1981) found that the presence of cyclothymia was higher in offspring of bipolar disorder, versus controls in a student sample. A tendency was also found for them to develop depressive or suicidal states as well as substance abuse, pointing to a strong bipolar diathesis (Akiskal *et al.*, 2000). Additionally, there is a suggestion that hyperthymic depressives, with familial excess of bipolarity disorder could be considered as presenting with an expression of a soft bipolar spectrum (though evidence for this is still unclear).

Moreover, recent research exploring sub-threshold expressions of hypomania below the DSM-IV cut-off (2-3 instead of 4 days), lead to increased prevalence rates of bipolar disorder (from 1 per cent to 5.5 per cent for mania/ hypomania and 2.8 per cent for brief hypomania) (Angst, 1998).

These findings provide some good support for re-evaluating the concept of bipolar disorder and other affective disorders. This topic is certainly being heavily debated in the literature, particularly in relation to the softer bipolar presentations, and is gaining increasing support. However, some argue this is a step too far and that there is a danger of over-diagnosis and blurring of the boundaries between what may be considered pathological and normal changes in mood. A recent article by Patten and

Paris (2008) suggests that the evidence presented requires further support using methodologically sound research designs (e.g. randomised controlled trials [RCT's]).

In line with these developments, bipolar disorder is being conceptualised on a broader clinical spectrum in this thesis. Including the softer clinical expressions of the disorder (e.g. on a temperamental basis and less than hypomanic), not necessarily currently recognised in modern classification systems, but more akin to historical traditions (e.g. Kraepelin) and recent propositions by Akiskal and colleagues. Such softer presentations are perhaps more likely to be observed in non-clinical setting (e.g. student samples), then the more severe forms of the disorder (e.g. bipolar I).

1.4 Epidemiology, co-morbidity and mortality

Estimating the prevalence rate of bipolar disorder is plagued by a number of methodological problems, not least in terms of diagnosing and classifying the illness but also depending on whether research favours a narrow or broad perspective. In reviewing the literature, Goodwin and Jamison (2007) report the overall lifetime prevalence of bipolar I to be estimated at approximately 1 per cent of the population, ranging between 1-1.5 per cent across the globe. Applying a broader perspective, the lifetime prevalence rates increase to 3-8.3 per cent of the population (Goodwin & Jamison, 2007). Furthermore, and in line with the spectrum debate, Akiskal (1996) argues that recent research suggest estimates of 3-6 per cent of the general population (possibly worldwide) exhibiting temperamental instability along hypomanic or cyclothymic lines. If these figures were added to full blown manic-depressive cases, prevalence estimates would increase to 5-7 per cent of the general population and

would reflect the entire spectrum of bipolar disorders (Akiskal, 1996). More recently, figures exceeding 10 per cent have been proposed to reflect lifetime prevalence of bipolar disorder, if a broader criterion was considered accepting mild and brief hypomanic presentations (Vazquez & Tondo, 2007).

Bipolar disorder places a high burden on society, considered by some to be one of the 30 leading causes of worldwide burden of illness (Murray & Lopez, 1996). It is associated with high mortality risk, with estimated overall rates of suicide (attempted or completed) to be approximately 1 per 1,000 person-years (Simon *et al.*, 2007) and one quarter attempting suicide (Prien & Potter, 1990). Co-morbid psychiatric or substance use is said to increase the risk of suicide attempts and co-morbid anxiety is associated with the risk of completed suicide (Simon *et al.,* 2007)

Bipolar disorder has also been considered to be a more severe illness than unipolar depression due to the nature of lifetime recurrence and greater co-morbidity with other psychiatric disorders (e.g. anxiety, substance abuse). Identifying the illness at an early stage is vital, as delayed recognition can lead to higher costs than those associated with unipolar depression (Angst, 2007). Estimates of annual cost for bipolar disorder in the UK are in the order of £2 billion (1999/2000 prices), including all patients with a diagnosis of "affective psychosis" (Gupta & Guest, 2002).

Summing up, the literature and understanding of bipolar disorder has evolved over time, with ongoing disputes regarding classification and segregation from other affective disorders (e.g. unipolar depression and psychosis). However, it is clear that

in its many forms, bipolar disorder is a disabling and lifelong illness and understanding its aetiology, expression and course are imperative in enabling early identification and detection of efficacious interventions. Although a medical disease model has dominated over the years, other theories have begun to emerge. The most influential theoretical approaches will be reviewed below, with a particular focus on psychological perspectives.

1.5 Theories

1.5.1 Biological theories

Given the emphasis over the years on applying a medical/disease model for bipolar disorder, it is not surprising that a significant proportion of the research in this area has focused on establishing a biological understanding of this disorder.

Findings from studies within families, twin studies and to a lesser extent, adoptive families, have identified a strong genetic link, with the risk of developing an affective illness being 10 times more likely in first degree relatives (Blackwood & Muir, 2004; Miklowitz & Goldstein, 1997). Despite the significant amount of research attempting to identify a specific gene to explain vulnerability to bipolar disorder, investigations have failed to do so and it is more likely that many genes play a role in vulnerability to this disorder (Goodwin & Jamison, 2007).

Other areas of interest in medical research have focused on investigating the neurochemistry and neuroanatomy of mood disorders, prompted by the purported efficacy of pharmacotherapy and advances in neuroimaging technology. To date,

theories relating to alterations in particular neurochemicals (such as deficiency in monoamine) have led to new pharmacological treatments being introduced with good results. It is considered that the introduction of lithium has enabled many patients diagnosed with bipolar disorder to improve their social functioning and reduce family burden (Miklowitz & Goldstein, 1997).

Lithium (mood stabiliser) or valproate (anti-convulsant agent) are considered as frontline pharmacological agents for long-term treatment of bipolar disorder (National Institute for Health and Clinical Excellence [NICE], 2006). However, although both treatments have shown good results in RCT's (e.g. Jones, 2001- on lithium efficacy), some individuals with bipolar disorder fail to gain benefits from these treatments with as many as 20-40 per cent not responding to lithium prophylaxis (Prian & Potter, 1990). Furthermore, lithium is not considered to be a good prophylactic agent in long-term maintenance, with about 37-40 per cent of individuals relapsing (Miklowitz & Goldstein, 1997).

With regards to structural brain abnormalities, neuroimaging studies have identified alterations in specific regions that occur independently of the illness episode, thus suggesting trait rather than state specific difficulties. It was once considered that individuals with bipolar disorder return to normal functioning outwith episodes. However, research is increasingly reporting the expression of sub-syndromal symptoms and related impairments continuing outwith episodes, with as many as 47 per cent over a 13 year period, reporting symptoms of depression and mania outwith

episodes. Sub-syndromal symptoms are likely to maintain difficulties in individuals' social and functional life and place further strain on families caring for them.

1.5.2 Neuropsychological

With the main objective of this thesis in mind (developing material for future investigation of cognitive styles in individuals vulnerable to bipolar spectrum disorders), it is necessary to consider the influence of any specific neurocogntive difficulties, which may play a role in influencing individuals' performance on cognitive tasks assessing attention or memory (e.g. Dot Probe, Stroop or recall & recognition tasks). Research in this area is faced with a number of methodological challenges, including a lack of agreed classification of neuropsychological tasks in cognitive domains (Quraishi & Frangou, 2002), small samples, a lack of agreed diagnostic criteria and difficulties in controlling for sub-syndromal symptoms (Martinez-Aran *et al.,* 2004). Furthermore, findings in this area of research have to be interpreted with caution due to the difficulty in separating out true cognitive difficulties from those resulting as a consequence of medication (Goodwin & Jamison, 2007). While there is some limited evidence for the impact of lithium on memory, vigilance and attention, findings are inconsistent, not that reliable and even less conclusive for other forms of medication (e.g. anti-depressants) (Quraishi &Frangou, 2002).

Although earlier research focused on assessing individuals with bipolar disorder during an acute phase, recent studies have used more methodologically robust

designs to control for episodic or illness effects for example, using remitted samples or children at risk of developing bipolar disorder (Goodwin & Jamison, 2007).

Notwithstanding the above, the literature does appear to report some general consistent findings. In a meta-analysis of studies comparing neuropsychological functions in individuals with bipolar disorder compared to healthy controls or a psychiatric sample, Goodwin and Jamison (2007) report deficits in areas associated with language, reasoning abilities, executive functions and marked deficit in performance IQ. More importantly (considering the potential avenues for future research suggested later), disturbances in attention were commonly found in individuals with bipolar disorder, across all phases of the illness. The key conclusion reached by Goodwin and Jamison (2007) is that deficits in learning, memory, attention and executive functions seem to be evident during all phases of the illness, and so could be considered as core disturbances relating to this disorder.

Other literature reviews report similar findings and conclude that there does not appear to be a global cognitive impairment in individuals with bipolar disorder. Rather, deficits are found in specific cognitive domains in symptomatic patients (Quraishi & Frangou, 2002). Similarly, Bearden *et al.* (2001) found little support for a unique cognitive profile in bipolar patients.

Of the few studies analysing fully recovered bipolar disorder participants, impairments are reported in areas of sustained attention, verbal memory and to some extent (but less conclusively) in executive function (Quraishi & Frangou, 2002). In

remitted samples, no impairment in general intellectual functioning, sustained attention or selective attention is reported, however, impairment in verbal memory and some executive functions are documented even in asymptomatic patients (Quraishi & Frangou, 2002). It seems likely that the severity and duration of the illness also influences the findings of cognitive deficits in this disorder group.

Considering future studies using verbally presented cognitive tasks (e.g. list learning/ recall of verbally presented material) with individuals with bipolar disorder, one may want to take into consideration deficits found in acquisition of new verbally presented information throughout all phases of the illness (Goodwin & Jamison, 2007). In a study comparing 40 euthymic bipolar disorder individuals with 30 healthy controls using the California Verbal Learning Test (CVLT), Martinez-Aran *et al.* (2004) found lower scores in the bipolar disorder group than controls on verbal memory tasks with the bipolar disorder group retaining fewer words and demonstrating greater difficulty in recalling information immediately and after a delay in free and cued form.

As demonstrated, it appears that difficulties in verbal memory, attention and, to some extent, executive function tasks have been consistently reported in individuals diagnosed with bipolar disorder. Teasing out difficulties with attention and memory is challenging, and it is debatable whether tests assessing these domains are in fact, truly testing the construct of attention, in its pure form.

In summary, although there is some good evidence to suggest a biological component in bipolar disorder, research in this field acknowledges that genetic and biological factors alone cannot fully account for the onset, expression, maintenance, and recurrence of bipolar disorder (O'Connell, 1986). Additionally, the efficacies of pharmacological treatments are limited, with only some patients showing therapeutic gains and high rates of relapse (Alloy *et al.*, 2005; Guscott, & Taylor, 1994). Having reviewed biological and neuropsychological findings relating to bipolar disorder, the following sections will consider the more psychologically oriented understanding of the disorder, paying particular attention to pertinent research relating to this thesis (cognitive research findings).

1.5.3 Psychological

Although psychosocial factors have been considered as playing a role in bipolar disorder as far back the Kraepelin era, research remains scant (Jones & Tarrier, 2005) and continues to predominantly focus on biological factors (Scott, 1995). A key aim of the present study is to contribute to filling this gap in the literature and, as called for by Jones and Tarrier (2005), to contribute to the development of robust psychological theories and models, which would both aid in better understanding the disorder and in developing efficacious psychological therapies.

As with all research investigating psychopathology in human beings, various methodological issues arise. Ideally, one would consider investigating at risk groups (e.g. children at risk of developing bipolar disorder perhaps due to familial vulnerability), first onset presentations (to limit the impact of previous episodes),

non-medicated populations and using longitudinal designs to control for illness specific factors (state or trait dependent factors) and predict the course of bipolar disorder. However, such research is almost never conducted and restricted by difficulties in classification and identification of the illness and ethical issues.

As a result, the majority of research investigating psychological vulnerabilities or maintaining factors in bipolar disorder, employ cross-sectional or retrospective methodological designs, which unfortunately restrict the ability to draw firm conclusions as to whether the difficulties expressed are a consequence of bipolar disorder or are independent of the illness (e.g. risk factors for developing the illness). In an attempt to overcome some of these problems, recent research has recruited individuals in remitted or euthymic states using healthy control groups and some have employed longitudinal designs. Alloy *et al.* (2005) suggests future research should aim to account for a third factor such as genetics by controlling for the family environment (e.g. a family history of bipolar) and focusing on life stressors that are independent of the individuals behaviour.

1.5.3.1 Developmental factors

Research on the relationship between personality traits and bipolar disorder is relatively new and limited by use of cross sectional designs. It is difficult to interpret causality from such studies, since personality and bipolar disorder may interact in a number of ways (Akiskal *et al.,* 1983). These studies provide tentative evidence of increased levels of trait neuroticism, irritability, and extraversion amongst adults with bipolar disorder compared to healthy controls (see Savitz & Ramesar, 2006).

However, these findings are not consistent in the literature and are certainly less established than findings from the depression literature (e.g. on the relationship between sociotropy and dependency traits).

Another group of studies has explored the role of early childhood experiences of parenting, attachment and maltreatment as developmental precursors to bipolar disorder. The findings from this literature suggest that there is some association between parenting involving low care, high overprotection and insecure attachment patterns and a later onset of bipolar disorder (Alloy *et al.*, 2005) Once again, however, these studies usually employ retrospective designs and fail to control for additional factors, such as family history.

1.5.3.2 Social environmental factors

There is some evidence to support the role of social and environmental factors in explaining the development, maintenance and expression of bipolar disorder. In particular, research has considered the impact of bipolar disorder on the individual's social functioning and behaviour; critical life-stressors influencing the onset or exacerbation of symptoms; and the family environment such as high expressed emotion (for a more detailed review refer to Alloy *et al.,* 2005).

Social support

It is not entirely clear how social support truly influences psychological well being, however, it is generally accepted that people with greater social support are of better mental health and at a lower risk of developing psychological problems. Social support may act as a buffer against psychological distress during episodes of stressful life events or it may also directly influence the individual's psychological well being and/or ability to cope (Lam *et al.,* 1999). Poor social support or family home environments with high expressed emotion or negative affective styles are likely to impact on the individual's speed of recovery and recurrence of an episode (Johnson & Roberts, 1995). Observing patients with bipolar disorder following hospitalisation over a 9-month period, Miklowitz *et al.* (1988) found that those patients returning from hospital to a stressful family life had increased risk of experiencing a relapse due to high expressed emotion within the family. This also appeared to impact on the individual's social functioning over time. Such clinical observations have paved the way for developing family interventions aiming to reduce family stress and increase communication, (Miklowitz & Goldstein, 1997). Family focused interventions (FFT) have been shown to improve family functioning and provide benefits to the individual (Scott & Gutierreze, 2004).

Life stressors

With regards to life stress, there is strong evidence to suggest that it can influence the course of bipolar disorder (e.g. Ellicott *et al.,* 1990). However, research in this area is limited by the difficulty in separating the individual's behaviour and family environment from life stress (Alloy *et al.,* 2005). Even when events caused by the

person's behaviour are controlled for, life stress is still shown to be an important factor in the course of bipolar disorder (Johnson & Roberts, 1995).

To understand the particular stressful life events triggering symptoms associated with affective disorders, some theorists have suggested that those stressful life events disrupting social rhythm (e.g. sleep-wake cycle) could trigger mood episodes, due to the negative impact that they have on biological mechanisms (e.g. circadian rhythm). Ehler *et al.* (1988) And Healy and Williams (1989) have attempted to explain this theory in relation to affective disorders.

Circadian rhythms are thought to be synchronized by two or more internal oscillators (Moore-Ede *et al.,* 1982). It is understood that 'zeitgebers' (environmental cues such as light-dark) help to synchronize these oscillators and regulate cycles, hence an individual responds by scheduling their life accordingly (when they eat, sleep etc.). The social zeitgeber theory postulates that significant life events occurring in an individual's life can disrupt the social cues, consequently further disrupting biological rhythms. This disruption, along with vulnerability (e.g. of a genetic nature) to affective disorders, may trigger the onset of depression. Healy and Williams (1988) further hypothesise that this pattern of disruption can also provoke overactivity, due to decreased need for sleep and hence may also influence the onset of manic type symptoms. Research attempting to support this hypothesis investigates events disrupting social rhythms such as the effects of Jet lag and night-shift working.

In bipolar disorder, it is thought that events causing disruption to circadian functioning such as lack of sleep (a factor dependent on the individuals behaviour and/or environmental factors such as night shift work) is likely to increase the risk of relapse (Jones, 2001). Current psychological interventions for bipolar disorder (e.g. cognitive behavioural therapy or prodromal monitoring) emphasise the necessity of maintaining healthy social routines (see Lam *et al.,* 1999)

Similar areas of research relating to specific life events focus on the individual's reward seeking behaviour (goal attainment). These behaviours are considered to be a likely risk factor for mania/ hypomania and have been explained, to some extent by the behavioural activation/ behavioural inhibition systems (BAS/BIS) model (Gray, 1976, 1982).

The BIS/BAS is conceptualised as a neuropsychological system that governs behaviour. The BIS relates to behavioural inhibition responses when presented with stimuli, which have been conditioned to negative stimuli (e.g. punishment and frustrative non-reward), as in anxiety. On the other hand, the BAS focuses on approach behaviour, hence increasing behaviour in response to stimuli that have been conditioned with positive stimuli or reward. When applying this model to bipolar disorder, research has focused primarily on the BAS to explain goal seeking behaviour in mania.

Depue and colleagues (Depue *et al.*, 1987; Goplerud & Depue, 1985) have attempted to apply the BAS system to bipolar disorder, by proposing that individuals vulnerable

to bipolar and cyclothymic disorder have more sensitive and reactive regulatory systems. They report that dysregulation in this system is shown by hypersecretion of cortisol and slower recovery to normal levels in both bipolar and cyclothymic individuals when under stress (Goplerud & Depue, 1985). The clinical features associated with mania/hypomania (e.g. elated mood and goal directed behaviour) are thought to relate to heightened BAS system activation, whereas the clinical features found in the depressive phase may relate to under activity in BAS system.

Research linking the BAS theory and life events to bipolar disorder describes activation of the BAS as a response to life events involving goal attainment. Johnson *et al.* (2000) interviewed 43 bipolar I patients on a monthly basis and asked about goal attainment and positive life events independently. They found that goal attainment life events but not general positive events were related to increases in subsequent manic symptoms but not in depressive symptoms. However, they wondered whether such findings related to other factors, such as disrupted sleep patterns, which can have a role in further disrupting biological rhythms and potentially leading to expression of manic type symptoms. Although this literature is illuminating in certain respects, it is beyond the scope of this thesis (but see Johnson, 2005).

Cognitive styles such as appraisal of information and maladaptive thinking have also been considered to influence behavioural responses (see below) and therefore add to the understanding of the expression and course of bipolar disorder and its affective symptoms.

Power (2005), suggests that the BIS and BAS model is limited by its two-dimensional approach to motivation and affect and argues that research findings testing this model are inconsistent. He goes on to describe more multi-level theories, which offer more comprehensive understanding of bipolar disorder, particularly its polarity.

The stress-vulnerability model has been helpful in conceptualising other disorders such as schizophrenia (Zubin & Spring, 1977) and has also been applied to bipolar disorder (e.g. Goodwin & Jamison, 2007). The model considers the interaction between biological, genetic and socio-environmental factors and offers integration of various theories in explaining the onset and course of bipolar disorder. It proposes that a pre-disposition to bipolar disorder (e.g. genetic) coupled with life stressors (e.g. high expressed emotion within a family environment) may impact on social functioning, coping and the individual's behaviour, thus further disrupting critical biological processes (circadian rhythm) that help to regulate the individual's internal state, and potentially triggering or exacerbating symptoms related to mania or depression (Miklowitz & Frank, 1999). The model allows for the integration of both psychological and biological theories as described above.

1.5.3.3 Cognitive Factors

This study aims to develop material to investigate cognitive styles and vulnerabilities in individuals with bipolar spectrum disorders. To date, the limited research in this area has, primarily, extended on cognitive theories of unipolar depression to

investigate the role of cognitive styles and vulnerabilities in the onset, maintenance and recurrence of bipolar disorder.

Prior to reviewing the empirical evidence, it is important to consider some of the theoretical principles underpinning this work. Cognitive theories relating to bipolar disorder have mainly been derived from unipolar depression theories, and although these provide useful insight into the mechanisms involved (mainly in relation to depressive states), may not always account for the polarity of bipolar disorder. Further research is necessary to develop comprehensive models for bipolar disorder taking into account the development of manic/hypomanic as well as depressive symptoms (Wright & Lam, 2004).

Another area that would profit from further research is whether bipolar and unipolar depressions are similar enough to merit the application of the same theories. Much of the research exploring cognitive styles in bipolar disorder, either include unipolar disorder compression groups, or draw parallels with findings from research investigating cognitive styles in unipolar. Reviewing this research is beyond the scope of this thesis and an interested reader may wish to refer to the comparative review by Cuellar *et al.* (2005). A key conclusion of the review is that many commonalities exist between unipolar and bipolar depression, including in cognitive style, suggesting a possible common aetiology. However, they point to mixed findings and highlight the need for further research to clarify the extent of the similarities. Furthermore, they suggest that differences reported between the two disorders may be more related to manic symptoms or the aftermath of manic episode

in bipolar disorder. Current classification systems distinguish between unipolar and bipolar disorders, however, there is ongoing debate as to whether they are separate disorders or lie on a continuum of affective disorders.

1.5.3.3.1 Cognitive theories

Cognitive models for bipolar disorder have been adapted primarily from Beck's cognitive-stress theories of depression (1967, 1976) and the Hopelessness theory of Abramson *et al.* (1989). The former suggested that maladaptive cognitive styles such as negative self-schemata, dysfunctional attitudes and personality styles (sociotropic/ autonomous), which have further implications for self-worth, act as vulnerabilities for experiencing depressed mood when individuals experience stressful life events. Furthermore, people who attribute negative events to internal, stable and global causes are also thought to be more vulnerable to feelings of hopelessness and to develop episodes of depression during these negative stressful events. Such thinking styles are considered to be influenced by earlier experiences and put people at risk of developing, maintaining and exacerbating depressive symptoms.

According to Beck (1967), negative self-schemas that have developed from early experiences may remain dormant when the individual is well, but are likely to be activated by stressful life events that have specific meaning for the individual (e.g. loss). When underlying negative beliefs are triggered, negative self-schemas impact on the way the individual perceives, interprets and recalls personally relevant experiences, constructing a negative bias of an individual's world, self and future

(Reilly-Harrington *et al.*, 1999). Depression is then maintained by selecting information in a negatively biased manner to support such beliefs, leaving the individual helpless and trapped in a cycle of despair. Such theories therefore illustrate the important role of cognition in understanding the aetiology and maintenance of depression and in developing appropriate therapeutic treatment methods.

To account for the expression of manic symptoms, Beck (1976) suggested that individuals with manic features are likely to hold equally unhelpful positive self-schemas (relating to themselves, their world, and their future) leading to cognitive distortions in the opposite direction to depression (extreme positive and unrealistic). Instead of negative events, positive events are selectively attended to and positive schemata are activated and influence the development of manic symptoms.

Several criticisms have been raised against the application of Beck's cognitive models to bipolar disorder. Firstly, it is considered limited to view mania as the polar opposite of depression, failing to consider other manifestations of bipolar disorder (e.g. mixed states) and not accounting for the expression of depressotypic cognitive styles associated in manic/ hypomanic individuals. Secondly, the model is limited in explaining whether individuals with unipolar and bipolar disorders share the same dysfunctional beliefs and/or how different personality styles influence such beliefs. Lastly, the model fails to identify the specific life events required to trigger underlying schemas precipitating mania or depression.

1.5.3.3.2 Psychodynamic theories

With these limitations in mind, other theorists have drawn on psychodynamic perspectives such as the 'manic-defence theory' to understand mania. The manic-defence hypothesis proposed by Karl Abraham considers the possibility that, although mania and depression are expressed in what appears to be two polar extremes in mood, they may share similar underlying psychological processes (as cited in Bentall, 2003). The expression of manic symptoms was hypothesised to be a consequence of the individual attempting to suppress/ deny underlying psychological distress as a defence against depression.

Later theorists further developed the manic-defence hypothesis by considering other influences such as cognitions and personality traits. Rado (1928) and Neale (1988) suggest that manic–depressive patients demonstrate narcissistic personality traits, driving them to seek approval from others (Bentall, 2003). As argued by Neale (1988), individuals vulnerable to experiencing mania tend to demonstrate an unstable self-esteem and endorse high expectations of success. In the presence of negative events, these vulnerable individuals are likely to experience feelings of low self-regard. To try and control such feelings and associated beliefs, they may respond by suppressing them and/or express grandiose ideas. This pattern may escalate and lead to mood elevation and mania. In this context, mania is not considered as a polar opposite to depression but is rather similar in cognitive terms (Alloy *et al.*, 2005).

1.5.3.3.3 Research findings relating to cognitive styles and vulnerabilities in bipolar disorder

This section will present the main empirical findings relating to cognitive styles in bipolar disorder. Findings should be interpreted with caution and considered in light of the following limitations: a limited number of studies; small sample sizes; use of mainly cross-sectional designs (as opposed to prospective longitudinal designs); lack of agreed classification for bipolar disorder; lack of control groups or sound comparative groups; lack of controlling for number of episodes; severity and state dependent factors; medication influences; and the type of measures used to assess cognitive styles. In an attempt to control for state specific difficulties, and draw tentative conclusions regarding underlying vulnerabilities (risk factors), some researchers have recruited remitted or euthymic bipolar samples (although these are also restricted by the presence of sub-syndromal symptoms in remitted states). Nevertheless, the preliminary research to date offers some valuable insight into the role of cognitions in bipolar disorder.

Two main methodological approaches have been employed to investigate cognitive styles in bipolar disorder: explicit self-report measures or more experimental methods adapted from cognitive science, with a view to identifying dysfunctional assumptions, negative attributions and/ thinking styles and maladaptive information processing styles. Some studies have also considered the role of stressful life events as implicated in theories of depression (e.g. Beck, 1967) or the role of goal attainment and regulatory systems in association with mania/ hypomania. The findings of this research will be reported in accordance with the different

methodologies applied. The few studies employing both research designs will be discussed in both sections.

Use of self-report measures to investigate dysfunctional attitudes, attributions and maladaptive thinking styles

Research investigating cognitive styles in bipolar disorder has primarily employed self-report measures, which have been criticised for their subjective nature and run the risk of obtaining socially desirable responses (Coolican, 1994). Most research in this area has been concerned with investigating hypotheses relating to cognitive models (e.g. Beck and Abramson) to account mainly for depressive states. Less emphasis has been placed on investigating hypotheses relating to the expression of mania. Of the few studies, Winters and Neale (1985) and Bentall and Thompson (1990) set out specifically to explore cognitive styles in bipolar disorder in relation to the manic defence hypothesis (described earlier). Both studies employed self-report and more implicit experimental methods to investigate attributional style and self-esteem in bipolar disorder. Self-esteem is investigated because it has been shown to fluctuate in bipolar disorder according to different episodes. It is hypothesised that low self- esteem may be present in both manic and depressive phases, but not directly expressed during mania.

Winters and Neale (1985) predicted that although bipolar manic patients would be unlikely to explicitly report low self-esteem when remitted, they would show high levels of self-deception and defensiveness compared to controls and that low self-esteem would be observed in a more implicit measure. Such evidence would support

the proposition that mania and depression share (to some extent) similar cognitive vulnerabilities.

The authors administered a battery of self-report measures to assess social desirability, self-deception and self-esteem (using the Self-Report Inventory [SRI-II], O'Brian & Epstein, 1974) on a group of remitted bipolar manic, unipolar depressed and normal controls. They also included an implicit task, the Pragmatic Inference Task (described below).

As predicted, the bipolar manic group reported higher scores on self-esteem compared to the unipolar group (though the same as healthy controls) and also scored higher on self-report measures of social desirability and self-deception compared to both other groups. Their findings support the hypothesis that manic participants show similar levels of self-esteem as healthy controls when directly assessed. The study is somewhat limited by the small sample size in each group; inclusion of mixed states in the bipolar disorder group; and current pharmacological treatment. It is therefore not clear how these findings would relate purely to mania or how medication would influence cognitive style. It would be helpful to replicate this study with individuals presenting with softer bipolar expressions (e.g. hypomania). Finally, the SRI-II measure does not appear to be used widely and has shown only adequate reliability.

In order to further explore the manic-defence hypotheses with softer bipolar presentations (hypomania) and account for some of the difficulties associated with previous treatment, Bentall and Thompson (1990) use a student sample. In doing so,

they argue that softer bipolar presentations have been found in non-clinical samples, with some people exhibiting relatively enduring hypomanic personality styles (e.g. Akiskal *et al.,* 2000). Participants were selected on the basis of high (hypomanics), medium and low scores (controls) on the Hypomanic Personality Scale (Eckblad & Chapman, 1986). They also administered measures of social desirability (as above), self esteem (Rosenberg Self-Esteem Questionnaire -SEQ: Rosenberg, 1965) and a measure of current severity of depressive symptoms using the Beck Depression Inventory (BDI; Beck *et al.,* 1961).

Unlike the study by Winters and Neale (1985), Bentall and Thompson found no group differences on measures of social desirability or self-esteem. They suggest that these particular cognitive styles are not relevant (as they are in unipolar depression) to understanding mania/hypomania in bipolar disorder. However, it is not clear how generalisable these findings are to a clinical population. They also used an alternative measure of self-esteem to that used by Winters and Neale (1985) and hence the findings may be associated with this variable. The authors also reported a non-significant trend towards higher BDI scores in the hypomanics, which is somewhat inconsistent with the manic-defence hypothesis, as they predicted hypomanics would not report depressive symptoms on explicit measures. This study is further evaluated in the next section reviewing information processing research in bipolar disorder.

Amongst a series of studies attempting to investigate cognitive styles associated with cognitive theories of depression, Hollen *et al.* (1986) set out to explore the utility of

measures assessing cognition associated with affective disorders and considering the differences and similarities observed between unipolar and bipolar disorder.

The groups in this study consisted of remitted and currently active bipolar I depressed (with a history of mania) and unipolar depressed patients, amongst other psychiatric disorders (some with secondary depression) and normal controls (students-not screened for current or past psychiatric history). It is worth noting that the bipolar groups appeared to have a more chronic and severe history (elevated number of episodes) compared to the unipolar depressed or secondary depressed clinical groups. Additionally, there was large variation in the type of medication between the groups.

Participants were compared on the BDI, Dysfunctional Attitudes Scale (DAS: Weissman, 1980), Automatic Thoughts Questionnaire (ATQ: Hollon & Kendall, 1980) and measures of personality. Importantly, the authors attempted to match participants on level of intelligence to reduce the possibility of this being a confounding factor.

Overall, no significant differences between the bipolar depressed or unipolar depressed group on dysfunctional attitudes and negative automatic thoughts were found (either during an episode or when remitted). Scores on these measures were within the clinical range only when participants experienced a depressive episode (not when remitted), pointing to a state rather than a trait dependent cognitive style. The findings are not consistent with previous research, which has found negative

automatic thoughts only during depressive states, but dysfunctional assumptions staying modestly elevated in remitted depressives. Hollen *et al.* (1986) suggest that the difference may be due to design issues (e.g. remission duration) and that dysfunctional attitudes perhaps take longer to normalise in transition from depressive episodes to remitted periods.

The findings point to the limited ability of these particular depressotypic cognitive styles to explain the aetiology of either disorder. The main methodological restriction is the reliance on measures of single class variables relating to cognitive phenomena. The study also fails to consider current or past treatment effects on and/or the relevance of intervening life events in relation to cognitive/ thinking styles.

On a group of bipolar I patients (euthymic) and healthy controls, Scott *et al.* (2000) assessed a number of variables considered to be dysfunctional (as proposed by cognitive theories, e.g. Beck 1967, 1976), including: dysfunctional attitudes (using DAS); over-general negative thinking (associated with memory recall of autobiographical material); self-evaluation (using the SEQ); and personality dimensions using the Sociotropy-Autonomy Scale (SAS: Beck *et al.*, 1983). The authors excluded psychiatric co-morbidities, past substance abuse and healthy controls if they reported past psychiatric history or family history of affective illness. This is important when taking into account evidence of familial bipolarity. Participants were also matched on level of intelligence.

Unlike Hollen *et al.* (1986), maladaptive thinking styles were found during remitted states, similar to that seen in unipolar depression. However, a substantial proportion of the bipolar group continued to show residual depressive symptoms even in remission. This may explain why maladaptive thinking styles were found during euthymic states, although significant results were maintained even when accounting for lingering depressive symptoms. The bipolar remitted group also showed cognitive styles related to perfectionism, which might explain some of the maladaptive thinking styles found to be associated with goal achievement in mania (for a review, see Johnson, 2005).

It is worth noting, that those bipolar participants with longer duration of illness and more frequent episodes revealed elevated cognitive abnormalities. Thus, it is unclear whether the chronicity of the disorder (e.g. longer duration) leads to increasing cognitive dysfunction or whether pre-morbid cognitive deficits lead to poor prognosis.

Unfortunately, Scott *et al.* (2000) findings can only be considered in relation to bipolar I disorder and may not generalise to the full spectrum of bipolar conditions. They also fail to report on previous treatment (e.g. psychotherapy) in the patient sample. Given the chronicity of their bipolar sample it is not unreasonable to assume that some form of treatment may have been involved. It is therefore possible that cognitive styles observed in this study may have been influenced by previous treatment, as well as current medication. Although, one might expect to find less

maladaptive cognitive styles in euthymic states, if previous treatment had been successful.

In a similar vein, but considering cognitive styles across different mood states (depressed, manic and remitted), Scott and Pope (2003) compared bipolar, unipolar and controls on measures of dysfunctional attitudes, self-esteem and personality. The Internal States Scale (ISS: Buaer *et al.*, 1991) was used to differentiate between different mood states in the bipolar sample. Unlike the studies above, a small sample of the bipolar participants was followed up to identify factors predictive of relapse and assess cognitive styles longitudinally.

Like Hollen *et al.* (1986) more similarities were observed between the unipolar and bipolar disorder group than differences overall, even when accounting for possible confounding factors (e.g. number of episodes). Differences were observed mainly in the level of expressed negative self-esteem and personality styles.

The unipolar group reported more negative self-esteem compared to the bipolar group, similar to the findings of Winters and Neale (1985). In the bipolar group, hypomanics expressed highest mean scores on both negative and positive sub-scales on a self-esteem measure compared to the depressed or remitted in this group. As the authors suggest, this may reflect possible preservation of self-esteem in hypomanic states, alternatively it could be that hypomanics report high self-esteem as a defence against depression (as implied by the manic-defence hypothesis). It may also simply reflect a mania induced response bias (e.g. as symptoms of hypomania increase, all

stimuli are regarded as highly relevant to them). However it is important to note that there was only a small sample (four) of hypomanics in the study.

Additionally, differences were apparent on a measure of personality styles, specifically when measuring sociotropy (as found in Scott *et al.,* 2000). In the bipolar group, those considered to be in a remitted state showed the highest scores on self-esteem and lowest scores for dysfunctional attitudes and sociotropy. This was reversed in the depressed bipolar group. The hypomanics showed increased levels of dysfunctional attitudes compared to those in remission, but those currently depressed had greatest dysfunction. Unfortunately, the study does not permit comparisons to be drawn directly between different bipolar states and the unipolar depressed group. In addition, only overall scores on measures are reported and when considering individual scores on sub-scales of measures, other interesting findings are noted but not considered (e.g. high scores from depressed bipolar group on a goal attainment and perfectionism sub-scale).

It seems from the study's findings that cognitive styles can fluctuate depending on the different affective states as seen in changes in dysfunctional attitudes, although some preservation of cognitive factors remains, e.g. self-esteem. This is not consistent with Hollen *et al.* (1986) findings of dysfunctional attitudes presenting as a trait like variable. Scott and Pope (2003) did exclude co-morbidity factors and substance abuse, though it is not clear how they confirmed patient's diagnosis (failing to report standardised diagnostic interview measures). The sample in this study had a wide range of illness duration and number of episodes, with an average

illness history of 16 years (although they do say that they account for number of episodes in their analysis). One must consider these findings in the light of the small samples and particularly regarding the 12 month follow up phase, where only 50 per cent of the bipolar sample was included. Additionally, only single self-rating measures were used to assess for manic and depressive symptoms rather than combined subjective and objective measures (e.g. clinician rated). There was also no indication of severity of depression studied, e.g. using BDI in the depressed or bipolar group.

Other studies have tried to test the cognitive-vulnerability hypotheses of Hopelessness, as well as Beck's theories in samples meeting criteria for bipolar/unipolar disorders.

Alloy, Reilly-Harrington *et al.* (1999) recruited a small sample of 43 undergraduates meeting clinical criteria for softer bipolar/unipolar presentations (cyclothymia, dysthymia or hypomanic) and normal controls. Diagnosis was confirmed, by more than one rater, using the Schedule for Affective Disorders and Schizophrenia-Lifetime Version (SADS-L; Endicott & Spitzer, 1978). The sample selected was largely untreated, therefore accounting for medical or psychological treatment effects, which could influence cognitive styles and/or coping with life stressors. Individuals with severe mood disorders, psychotic, organic or other conditions likely to influence cognitions were excluded.

Participants were assessed on 3 different occasions (over an average period of 4.7 weeks, range of one-nine weeks) as different mood states occurred naturally (e.g. cyclothymics were assessed in normal, depressed and hypomanic mood states). All participants were assessed in normal mood state at time 1. The study design enabled the authors to assess longitudinally the cognitive vulnerability hypotheses; consider the stability of cognitive patterns; and examine differences in cognitive styles in different mood states. Mood state at different time points were confirmed using self-report measures of depression and mania/hypomania, the BDI and the Halberstadt Mania Inventory (HMI; Halberstadt & Abramson, 1998).

The authors measured dysfunctional attitudes (DAS), negative attributional style (ASQ) and state cognitions (using the self-perception questionnaire –SPQ; Greenberg & Alloy, 1989). To investigate the role of life events, the Life Experiences Survey (LES: Sarason *et al.,* 1978) was administered.

Consistent with the hopelessness theory, negative attributional styles (internal, stable and global) for negative events shown at time 1, interacted with subsequent negative events to predict increase in depressive symptoms at time 2 and 3. Interestingly, similar attributional styles for positive events shown at time 1, also interacted with subsequent positive events to predict increase in hypomanic symptoms at time 2. However, dysfunctional attitudes did not interact with life events to predict change in depressive or manic symptoms, potentially due to differences in the measures used, with the ASQ appearing more real life and perhaps more applicable to the individual than the DAS.

Other findings revealed that, in general, cognitive patterns (attributional styles and dysfunctional attitudes) remained stable across different mood states as assessed over three time points. In contrast, the more state like self-perceptions did differ as a function of current mood (e.g. cyclothymic self-referent thoughts were more negative when depressed then when hypomanic or euthymic). However, differences were observed between the groups, with cyclothymics and dysthymics showing more dysfunctional attitudes and more depressogenic attributional styles for negative events than the hypomanics and normal controls (whose score did not differ from each other). This finding is interesting as cyclothymics experience both hypomanic and depressive symptoms yet showed attitudes and attributions more similar to dysthymics than the other groups.

As in previous research, similarities observed between bipolar and unipolar groups (e.g. cyclothymic and dysthymic) illustrate a possible continuity between the disorders. It also offers some support for the manic-defence hypothesis, which suggests that similar psychological mechanisms are observed between unipolar and bipolar disorders (although these cognitive styles were expressed explicitly here). The hypomanic group in the study revealed more positive attitudes and attributions for positive events similar to controls, thus suggesting that unipolar mania/hypomania may be quite different from mania/hypomania in the context of depression (e.g. cyclothymic). However, no reliable effects are observed on the positive composite of the ASQ, therefore these findings should be interpreted with caution.

The Alloy, Reilly-Harrington *et al.* findings are not consistent with previous studies showing improvement of cognitive styles in remitted states, though, it could be argued that this may relate to the small sample size and insufficient power to detect change. They also consider whether their findings relate to their sample being largely untreated, with previous studies testing similar hypotheses in treated clinical samples outwith the context of their natural environment. The study is further limited by the use of self-report measures alone and assessment of mood state using purely self-report symptom severity measures, rather than more objective clinician based measures (especially when the measure of manic symptoms shows limited validity). The authors could have used the ISS to discriminate mood states, as has been widely used in other studies of bipolar disorder and has been shown to have good reliability (Bauer *et al.*, 2000)

As in the previous study, Reilly-Harrington *et al.* (1999) explore hypotheses in line with cognitive theories using a similar methodology. However, an implicit measure of self-referent processing is also included to further assess interaction of life events and cognitive styles in predicting increase in manic and depressive symptoms.

Participants from an undergraduate sample were selected on the basis of meeting symptoms consistent with depressive or bipolar states (on a lifetime or trait basis). Diagnostic presentation was confirmed using the SADS-L, however, unlike Alloy, Reilly-Harrington *et al.* (1999), the SADS-Change (SADS-C; Spitzer & Endicott, 1978) was also used to confirm mood state (depressive and manic symptoms) at

Time 2. This measure is clinician based and could be considered more objective than self-report methods alone. The study unfortunately does not report co-morbidities and no information is available on participants' past psychiatric history (e.g. presence of depression).

The authors administered the same cognitive measures as in the previous study, to assess negative attributional style, dysfunctional attitudes and life events at both time points (with a period of approximately 4 weeks between assessments).

Consistent with some previous work (e.g. Hollen *et al.*, 1986; Winters and Neale, 1985) but unlike findings from Alloy, Reilly-Harrington *et al.* (1999), Reilly-Harrington *et al.* (1999) found mostly an absence of group differences in unipolar and bipolar groups on measures of cognitive style. As predicted, cognitive styles (both using DAS and ASQ) were found to interact with subsequent negative events to prospectively predict increase in clinician rated depressive symptoms in both the unipolar and bipolar groups. More surprisingly, the same interaction accounted for increase in manic symptoms in the manic participants. Unlike the previous study, Reilly-Harrington *et al.* (1999) supported both cognitive styles implicated in Hopelessness and Beck's theories as vulnerability for future episodes. In contrast, Alloy, Reilly-Harrington found that dysfunctional attitudes (as measured by the DAS) did not predict change in symptoms either alone or in interaction with events in any of the groups assessed.

Reilly-Harrington's findings reveal that participants' cognitive style and information processing differed when in a depressed or not depressed state, hence not supporting stability of cognitive styles across mood states, as demonstrated in Alloy, Reilly-Harrington's study.

Finding interaction between life events and cognitive styles for mania and depression is in line with previous research suggesting that life events precipitate both mania and depression (Johnson & Roberts, 1995). These findings suggest that similar cognitive vulnerabilities exist for predicting increases in depressive and manic symptoms (a somewhat similar proposition to that made by the manic defence hypothesis).

Although interesting, the use of self-report measures alone to assess life events may be limited by event reporting bias. Perhaps this could be improved upon by confirming events with significant others (e.g. family members), although this can also be subjective. Another factor to consider is the short length of time between assessments in relation to other factors (such as transitions between episodes or symptoms of a prodromal phase). Also, in Reilly-Harrington's study only 5 participants were actually in a manic phase. It is possible that the changes observed in symptoms between time points may not be specifically related to stressful life events, rather the fact that a modest proportion were not in an episode at time 1, and may have been approaching an episode by subsequent assessment at time 2.

The two studies above show some promising support for applicability of cognitive theories of unipolar disorder to a bipolar spectrum disorder. Reilly-Harrington *et al.* show negative events interact with negative cognitive style to predict depression and mania in bipolar groups. However, Alloy, Reilly-Harrington *et al.* found positive events interacted with positive cognitive styles to predict manic/hypomanic symptoms. Further investigations are clearly needed to determine under what conditions positive vs. negative events and positive vs. negative cognitive styles provide vulnerability to mania/hypomania and to determine what factors influence the type of episode an individual vulnerable to bipolar condition will experience at any one time. More recent research considering the role of circadian rhythm disruption, may provide a fruitful avenue for research in this area

In summary, findings from research employing self-report measures to investigate cognitive styles in bipolar disorder reveal fairly mixed results. There seem to be general similarities between unipolar and bipolar disorder, particularly in depressive episodes. However, the findings are unable to explain what particular cognitive deficits/vulnerabilities are most important in understanding the aetiology and maintenance of each disorder. Some researchers have attempted to identify trait and state deficits and assess the stability of cognitive styles across differing mood states. However, the evidence thus far is limited and inconclusive.

Using self-report methods alone can be limited and one needs to consider the relative applicability of such measures (which have mainly been developed from theories of unipolar depression) to bipolar disorder samples. More recently, new measures such

as the 'Hypomania Interpretations Questionnaire' (Jones *et al.,* 2006) and the 'Brief-Hypomanic Attitudes and Positive Predictions Inventory' (Mansell & Jones, 2006) are being developed to investigate the role of cognitive styles in mania and/or hypomania.

Information processing bias

As suggested by cognitive models (e.g. Beck, 1967:1976), information-processing biases (e.g. mood-congruent bias) may be important in predicting the onset and maintenance of depression. Such hypotheses have been widely explored using experimental cognitive paradigms in unipolar research (for a review see Mathews & MacLeod, 2005). This strand of research has also been used to investigate information-processing biases to anxiety/threat related stimuli in anxiety disorders (e.g. Mathews & MacLeod, 1986, MacLeod *et al.*, 1986; McCabe, 1999) in line with hypotheses of hypervigilance and misinterpretation of internal state symptoms (e.g. Clark, 1999; Wells & Mathews, 1994). These investigations have also been extended to non-psychiatric populations, considering, for example, self-focused attention to pain related stimuli (Asmundson *et al.,* 1997) and specific medical illnesses (e.g. Henderson *et al.,* 2007). While these methods for exploring information processing bias to particular salient stimuli are well established, they have only recently been employed and are still in the developmental phase in the study of bipolar disorder.

The materials used to explore information processing biases mainly involve the use of stimuli relevant to the particular disorder being assessed. In many experiments, these stimuli are word lists (e.g. positively and negatively toned personality trait

adjectives) and are used in tasks such as the Stroop or dot probe (as will be described later), recall and recognition. Self-referent processing measures such as the Pragmatic Inference Task (described below) have also been used. Studies employing such methods will be reviewed here with specific reference to findings of cognitive processing styles in bipolar disorders.

Among earlier studies using multi-method approaches, Winters and Neale (1985) and Bentall and Thompson (1999) employ both information processing tasks and self-report measures to test predictions associated with the manic-defence hypothesis (see pp. 29-34).

Winters and Neale (1985) use a Pragmatic Inference Task (PIT) presented as a memory test to avoid conscious response bias on remitted bipolar manic, remitted unipolar depressed and normal controls. The PIT consists of 12 short self-referent scenarios divided equally to describe successful and failure outcomes adapted from the Attributional Style Questionnaire (ASQ; Seligman *et al.*, 1979). All scenarios imply both an internal and external locus of causality. After listening to each story, participants are required to respond to four multiple-choice questions. The target question requires participants to choose either an internal or external cause for the outcome. Other questions require recall of implied and factual information from each scenario (not related to causality). It was predicted that the bipolar remitted patients would infer positive events due to external factors and negative events to internal ones.

The bipolar group explicitly reported higher self-esteem compared to unipolar group (though same as controls) and higher scores on measures of social desirability and self-deception (compared to both other groups). On the PIT, the bipolar remitted group, like the remitted depressive group, attributed significantly more negative events to internal causes than controls. However, there were no significant differences between the three groups on success scenarios. Although the bipolar remitted group were defensive about self-esteem, the PIT task seemed to have been successful in bypassing this defensiveness. They conclude that bipolar remitted patients, like the remitted depressives, appear to be aware of low self-esteem but unlike the depressives, they try to avoid it (defensive) by reporting normal levels of self-esteem on explicit measures thus providing some support for the manic-defence hypothesis.

Bentall and Thompson (1990) also explore hypotheses relating to the manic-defence theory, using a student sample rather than a clinical sample. As in the previous study, they assess social desirability, self-esteem and depressive symptoms using self-report measures, however, they employed an Emotional Stroop Task (EST) adapted from research in cognitive and social science (e.g. Gotlib & McCann, 1984; Williams & Boadbent, 1986) as their implicit measure. This particular task has been used extensively to assess information processing of emotionally salient stimuli (words) in many conditions, including unipolar depression and anxiety related disorders. (See Williams *et al.,* 1996).

The EST involves using stimulus cards to present a list of emotionally valanced and neutral words. The study included emotionally neutral words of depressive content and words of manic related or euphoric content. Information processing bias is confirmed by the time taken to complete the colour naming for each particular stimuli. The words were matched for length and frequency of use in the English language. However, the authors fail to report the criteria for selecting words and it is not clear if they were piloted on a prior independent sample.

It was predicted that the hypomanic group would show attentional biases to depressive but not euphoric or neutral stimuli, but they would not find negative cognitive distortion on more explicit measures. Although the hypomanic group were slower to name depressive words, the interaction between group and condition failed to reach significance. However, when the level of interference experienced in emotional conditions was considered, it was found that the greatest interference was caused by depressive words, particularly in the hypomanic group. To ensure the findings did not relate to depression, the BDI was correlated with the Stroop and found to be non-significant. Interestingly, the hypomanic group also reported some depressive symptoms on explicit measures.

It seems therefore that more support for the manic defence hypothesis stems from using clinical participants with more severe expressions of bipolar disorder as in Winters and Neal (1985) study. However, they fail to distinguish between bipolar I and mixed episodes, and so it is not clear whether findings relate only to mania. Bentall and Thompson's (1999) study allowed exploration of similar hypotheses on

softer bipolar presentations (untreated student sample), however, it is difficult to generalise their findings to a clinical sample. Furthermore, both studies are limited by small samples and do not assess cognitive styles over a longer period of time, across different affective states. Finding maladaptive cognitive styles in remitted groups, demonstrate possible trait-like cognitive deficits in bipolar disorder. It could be argued that using multi- method approaches make it difficult to establish whether the results relate to differences in the measures and tasks used (do they measure the same construct?) or whether they relate more to different cognitive processes implicated by the different tasks and measures administered in these studies. Lastly, the findings may be better explained by anxiety, which interferes with the EST and was not accounted for in the study (French *et al.,* 1996).

French *et al.* (1996) replicated and improved on Bentall and Thompson's study, by paying particular attention to anxiety using the 'State-Trait Anxiety Inventory' (Spielberger *et al.,* 1983) in a student sample. Like Bentall and Thompson, they found that the hypomanic group showed slower colour naming of depression related words compared to euphoria related words, which was not mediated by either anxiety or depression. Although Bentall and Thompson's (1989) study demonstrated some results inconsistent with the manic-defence hypothesis (depressive symptoms being reported on BDI by hypomanics) French *et al.* (1996) suggested that similar findings in their study may be accounted for by anxiety rather than depression and that perhaps hypomania is at least partially successful as a defence against depression.

Further improving on the previous studies, Lyon *et al.* (1999) investigated the manic-defence hypothesis by comparing a sample of manic and depressed bipolar individuals to normal controls on a number of cognitive measures. They assessed current psychological functioning (depressive symptoms and self-esteem); attribution style (implicitly and explicitly using the Attribution Style Questionnaire Parallel form [ASQpf] (Lyon *et al.,* 1994) and the PIT (described above); attentional bias to mood-congruent information using the emotional Stroop task (as in Bentall & Thompson); and finally, a self-referent incidental recall task (SRIRT) similar to that used in studies considering the role of self-schemata in depression and paranoia (e.g. Dent & Teasdale, 1988; Williams *et al.*, 1990; Bentall & Kaney, 1996).

The SRIRT is presented as a self-report questionnaire, consisting of 30 self-statements used to measure self-referent encoding by recall of words. Participants are asked to indicate whether each statement describes them. The items included mixed (12 positive/12 negative and 6 neutral) trait adjectives. Following completion of the questionnaire, participants were than asked to recall as many of the trait adjectives as possible (measuring attentional and memory bias to such information).

The findings from the bipolar depressed group revealed that they exhibited greater negative attributional style on both types of measures (ASQpf and PIT), similar to previous findings in unipolar depression and remitted manic individuals. They also showed slower colour naming for depression related words on the EST, endorsed more negative trait words (compared to controls and manics) and recalled more negative trait adjectives on the SRIRT than controls, as expected.

The bipolar manic group on the other hand, showed more positive attributional bias and endorsed more positive words on the SRIRT task, similar to normal controls. Interestingly, on the recall sub-task of the SRIRT, manics recalled more positive and negative words than controls or depressed groups. On the EST, the normal controls revealed no significant differences in processing negative, positive or neutral words. However the bipolar manic group, showed comparable interference of depressive rather than euphoric words to that observed in the bipolar-depressed group. Finally, significant group differences were observed in self-report measures of low-self esteem, with the bipolar manic group reporting similar levels of low-self esteem as the normal control group, unlike the low scores revealed in the bipolar depressed group.

Overall, findings point to similarities between unipolar and bipolar depression. They seem to be characterised by a negative self-schema, tendency to blame the self for negative experiences and selectively attend to depression-related stimuli, suggesting psychological continuity between the two different disorders. In the manic group, findings were more in line with healthy controls on explicit measures yet more similar to depressed group on other tests. When assessed explicitly, manic participants describe a positive view of the self unlike when assessed on implicit measures, where their scores are comparable to depressed participants. Lyon *et al.* (1999) findings further support the manic defence hypothesis, suggesting that when bipolar manic participants are primed by appropriate stimuli (e.g. that reflects negative self-representation) they either consciously experience feelings of low self

worth and therefore become depressed or defensive and so respond in grandiose fashion. However, the authors stress that this does not explain why the manic defence is sometimes triggered and other times not. They consider the influence of other variables such as level of life stress at the time of assessment.

As the authors point out, the ASQ has shown limited psychometric reliability and hence poses some difficulties in drawing firm conclusions from this study. The study also fails to report patients' past psychiatric history and number of previous episodes. It is possible that the number of episodes may impact on self-referent information being attended to (e.g. with more episodes, the patient may be more sensitive to interpreting information as relevant to them, demonstrating a hypersensitivity to self-relevant information). Additionally, co-morbid conditions may have also impacted on the results (e.g. anxiety), though it is not reported whether the patients were experiencing any co-morbid conditions. In addition, the reliability of self-reporting of symptoms in manic participants is potentially problematic given difficulties in level of insight.

Similarly, Reilly-Harrington *et al.* (1999) found little difference between remitted bipolar and unipolar participants compared to controls on a self-referent information-processing task. In their multi-method study, they use a 'Self-Referent Information Processing Task' (SRIP; Alloy *et al.,* 1997; Greenberg & Alloy, 1989) to assess cognitive processes in bipolar and unipolar disorder individuals and normal controls over a period of time, accounting for interaction of life events.

The SRIP battery measures the processing component of the self-schemata featured as vulnerabilities for depression in Beck's (1967; 1976) theories. This consists of four tasks assessing five information-processing effects. Each task includes four types of stimulus content (words), matched for length, frequency and social desirability (negative & positive depression relevant words; negative & positive depression irrelevant words). Tasks involve assessing judgements of self-descriptive trait words (as in the SRIRT in Lyon *et al.,* 1999 study) and also provide examples of past behaviour associated with such words (self-descriptive) and prediction of future behaviour relating to such words. Finally a free recall task is administered with time delay from the battery of tasks.

The study revealed findings consistent with cognitive theories of depression for both bipolar and unipolar groups. Negative life events interacted with negative cognitive style to predict increase in depressive, and interestingly, also manic symptoms over a period of time. These findings were apparent in both methodologies applied (self report and information processing styles). This is interesting, as the cognitive styles assessed in the study are typically associated to theories of unipolar depression. The authors suggest that such findings point to similar psychological processes, which may increase vulnerability for both depressive and manic symptoms. This is compatible with previous findings associated to manic defence (e.g. Winters & Neale, 1985). In addition, it reflects similarities in cognitive style between unipolar and bipolar disorder.

Although no significant differences were obtained on the SRIP negative and positive composites used in the cognitive vulnerability stress analyses, some differences on components of this assessment were observed between the groups. The remitted bipolar participants were more likely to endorse negative trait adjectives and less likely to endorse positive trait adjectives than unipolar and normal participants. They also predicted that they would be more likely to behave in depression-relevant than non-depression relevant ways in the future, compared to remitted unipolar or control participants. Finding negative cognitive styles in remitted bipolar groups, similar to unipolar disorder is not entirely consistent with previous studies. One may also expect to find the unipolar group to show equal or increased negative responding compared to the bipolar group.

Reilly-Harrington *et al.* (1999) study is important as it takes into account psychosocial processes (e.g. environmental stress) interacting with cognitive vulnerabilities to predict relapse or exacerbate symptoms. It is noteworthy that the cognitive self-report measures were administered prior to the information processing tasks and hence it is possible that this may have influenced information processing bias, by priming participants to negatively related information, which may have also impacted on participants' mood. It is disappointing that the authors do not discuss the group differences, however, it seems that their main predictions were overall confirmed.

Using more advanced methods to assess cognition, Murphy *et al.* (1999) explored the neuropsychological profile of individuals meeting diagnostic criteria (DSM-IV) for

mania and unipolar depression compared to healthy controls. More relevant to this thesis, they examine inhibitory control and the presence of mood-congruent attentional bias, using an affective shifting task. Participants were matched for IQ level and age and excluded for a history of organic difficulties or substance abuse.

In the affective shifting task, words (sad, happy, neutral) were presented on a computer screen one by one in random orders. Half the words were target words and half were distracter words. Participants were asked to respond to target words by pressing a key as quickly as possible, but withhold their response to distracter items. Words were presented in blocks some of which are "shift" blocks (participants respond to stimuli which are distracter and cease response to target stimuli as presented in previous block) and some are "non-shift" blocks (participants continue to respond to target stimuli and withhold response to distracter shown in previous block). By assessing response performance (e.g. time to respond, errors made and omissions) conclusions can be drawn on participants inhibitory response abilities, reverse (shift set) and mood-congruent bias.

Murphy *et al.* (1999) found overall, global cognitive impairment in both manic and depressive participants on neuropsychological assessment of memory and attention. With regards to information processing, they found that the manic group showed a processing bias for positive stimuli, whereas the depressed group revealed a bias towards negative stimuli. Bipolar manic participants also demonstrated general impairment in focusing attention on neuropsychological tests. It was therefore surprising that they were able to focus on positive stimuli on the affective shifting

task. However, the authors suggest that perhaps it was that very style of processing (focus on positive stimuli) that led to more general attentional problems on other tasks. Finally, the affective bias and impaired ability to shift focus of attention observed in this study in the depressed group, is thought to be consistent with perseverance of low mood and rumination, typically found in depressed people. Overall, although some similarities were observed in cognitive performance in both clinical groups, the impairment observed in inhibitory control differed and suggests that different mechanisms are deficient in different episodes.

Several limitations of the study are of note. Most participants were being treated with pharmacological agents and it is unclear how this may have interacted to effect cognition in general, especially given that each type of medication may have differing influences. Also, the authors suggest that the observed effects on affective shifting task might be related to other factors, such as focus on accuracy, instead of speed, though difficulties inhibiting control was considered more plausible in explaining the findings.

In a similar vein Jongen *et al.* (2007) used a dot-probe task and a spatial cueing paradigm to explore and compare attentional bias to emotional stimuli and general orienting processes in a group of bipolar (euthymic state), bipolar (mildly-depressed state) and healthy controls.

The dot-probe task, involves the presentation of two words (different emotional valence) presented together on a computer screen. The words are removed after a

specific time interval and a probe is presented in one of the positions previously occupied by a word. Participants must respond by pressing a key as soon as the probe appears. Attention bias is demonstrated by the speed of response to the probe. The task was adapted to also assess general orienting process, using a spatial cueing paradigm. As well as the two words presented, arrow cues also appear in the middle of the words (this also ensures that participants fixation is centred). The arrows may be predictive or non-predictive of the direction of the probe. The quicker the person responds to predictive arrows (valid trials) compared to non-predictive arrows (invalid trials), reflects their general orienting.

In relation to general orienting, all groups showed orienting in response to arrow cues. The inability to disengage attention was positively correlated with level of depressed mood. Thus the difficulty in disengaging attention from negative information was associated with depressed mood levels as demonstrated in previous studies and in line with theories of depression and rumination.

The findings on the dot-probe (measuring attentional bias) reveal differences amongst the groups. The mildly depressed bipolar group showed an attention bias away from both negative and positive stimuli. This is not consistent with previous findings (e.g. Lyon *et al.,* 1999) of negative information processing bias associated with depressed mood and does not support theories of information processing in depression such as Beck (1967). However, unlike Lyon *et al.* (1999) this study employed a dot-probe task rather than an emotional Stroop task. It has been considered that perhaps Stroop tasks do not provide an unambiguous measure of

selective attention (see Williams *et al.,* 1996 for a review of the Stroop task). Jongen *et al.* (2007) hypothesise that a bias away from all emotional stimuli in mildly depressed groups may be unique to bipolar patients in a depressed state. Alternatively, the finding may relate to the individual's affective state at the time of assessment, suggesting perhaps some may have been in a transition period from mild depressions to a euthymic state.

Unlike previous findings in depressed or dysphoric patients, Jongen *et al.* found a strong relationship between levels of depressed mood and a bias away from depressive related words. Anxiety is considered as a possible confounding factor, given the high levels of anxiety found in the patient sample. It has been shown in other investigations exploring similar cognitive styles, that anxious individuals can initially engage their attention to dangerous material, but then strategically move attention away during longer presentation of the material. However, it is likely, anxiety alone cannot fully explain the finding of this study, particularly with contradictory evidence from depressed groups (who are also anxious) showing bias towards negative information.

The authors also found that a bias away from positive words was equally present in the euthymic and mild depressed group, suggesting that this is a trait factor. However, the euthymic group also showed a bias towards depression related words. Again they consider whether this finding reflected a transition from a euthymic to a depressed state, (although the depressed group did not show a bias towards negative stimuli as predicted).

As in the previous study, medication use was not excluded and hence findings must be interpreted with caution, as it is unclear what impact medication may have had on cognitive performance. Also, patients in the bipolar depressed group were only mildly depressed and perhaps findings may not be typical of what would be observed in more severe forms of depression and therefore less comparable to unipolar depressive studies. It would have been useful to also include a manic/ hypomanic group to consider state or trait effects in attentional bias and considering information processing hypotheses relating to mania. This study represents a promising attempt at employing more experimental paradigms to the study of cognitive styles in bipolar disorder, however, it would require replication over a long period of time, across differing states and compared to a unipolar disorder group.

1.5.3.3.4 Summary of research findings relating to cognitive factors

The study of cognitive vulnerabilities, which lies at the centre of this study, has been explored substantially with unipolar depression and is increasingly featuring in the investigations of bipolar disorder. Methodologically, research in this area has predominantly employed self-report measures, which are limited by subjective reporting. It seems that employing different methodologies in the study of cognitive styles in bipolar disorder is a useful strategy. The few studies that have applied more experimental procedures to explore information processing biases are only recently being employed in bipolar disorder and although reveal interesting but mixed results and require further exploration and more refining of study designs. Longitudinal designs to assess stability of cognitive styles are lacking.

Overall, similarities seem to be observed between unipolar and bipolar disorders, thus providing preliminary support to cognitive theories such as Beck (1967; 1976). However, research in this area is in its infancy and clearly more advanced and methodologically sound studies are required to further explore cognitive styles in bipolar disorder. Findings in relation to mania show limited support for the manic-defence hypothesis. It is possible that more emphasis has been placed on exploring cognitive styles more likely to be observed in depressive episodes, given the vast amount of research in unipolar disorder and well-established theories of depression. The lack of emphasis on mania could partly be explained by the limited theoretical basis on which investigators may begin to explore.

More recent research considers other possible mechanisms involved in the development and maintenance of mania/ hypomania such as, goal striving behaviour and success expectations. In a comprehensive review Johnson (2005) proposes a tentative framework for understanding mania/ hypomania, based on two key clinical and empirical findings (e.g. Johnson & Carver, 2006; Thomas *et al.*, 2007), and theories of self-regulation such as the BIS/ BAS (see pp. 21-23) and also Carver and White (1994).

Firstly, evidence suggests that high goal setting behaviour appears to be a stable characteristic in individuals with bipolar disorder (e.g. higher accomplishment, elevated achievement motivation and ambitious goal pursuits), which are apparent outside of episodes (trait like variables) and to a lesser extent have been found in

family members with a history of mania. Secondly, unrealistic high success expectancies appear to emerge with symptoms of hypomania and after initial success (people with a history of mania seem to show sensitive and extreme mood reactivity (based on the BAS), especially when faced with success or reward tasks).

The framework described by Johnson, shows an interaction between a predisposed mild vulnerability of dysfunctional cognitive styles (e.g. high expectations and likelihood of success in accomplishing a particular task), and an experience of success or hypomanic symptoms (elevated mood), lead to possible exacerbation of a pre-existing unrealistic confidence. Consequently, increased confidence may lead to excessive involvement in more ambitious goals if the person has an ambitious baseline, further exacerbating manic symptoms (if success is experienced after the goal-oriented task). However, confidence about important goals seems to fluctuate and the framework is unable to account for this alteration.

Although interesting, Johnson's framework at present is limited by lack of empirical data to support its propositions. Preliminary findings relating to goal attainment and high expectations, further suggest a possible continuum between mania and hypomania, although it is not clear what specific characteristics observed are more prominent in bipolar I or bipolar II. Unlike the consideration of a continuum between bipolar and unipolar depression, Johnson (2005) argues that findings of dysregulation and goal attainment in mania suggest that perhaps different psychological vulnerabilities may exist for depression and mania.

1.5.4 Integrative theories

Research attempting to investigate the role of psychological mechanisms involved in bipolar disorder has only developed in the past two decades, much of which has suffered from various methodological problems. A key theme raised throughout this review is that different individual theoretical perspectives alone (whether biological, psychosocial or cognitive in nature) cannot fully explain the complex nature of bipolar disorder. More recently, the trend is towards integrating these different perspectives into more comprehensive models in an attempt to explain the complexity of the disorder.

One prominent example is the work of Lam *et al.* (1999) who propose a vulnerability stress model for bipolar disorder. They describe the impact of disruption in social routines on biological rhythms. Disruption may be caused by stressful life events and / or disruptive behaviour by the individual. It is proposed that it is not necessarily the disruption on biological rhythms that lead to an acute episode, but rather, it is how an individual copes (e.g. ruminate, increase reward seeking behaviour) during the prodromal phase that will influence relapse.

Lam *et al.* (1999) suggest that individuals with bipolar disorder are more sensitive to environmental signals of rewards, leading to goal directed activity during early stages of hypomania as described by Johnson (2005) and to signals of frustrative non-reward leading to disengagement during early stages of depression. Misattribution of bodily symptoms to personal weakness or self-potency, can further the course of developing from prodromal to acute. Later episodes may than be

influenced by potential stressors resulting from the aftermath of the previous episode (e.g. impulsive behaviour may lead to financial consequences/ loss of employment, causing further stress). Lam *et al.* draw on investigations exploring the role of the BAS (regulatory systems-goal seeking), coping behaviour and cognitive styles (e.g. achievement oriented) in bipolar disorder. As in Beck's (1967) model, individuals are considered to have negatively biased thought processes, impacting on behaviour within their environment, which may further reinforce their negative self-schema.

Wright and Lam (2004) suggest goal attainment beliefs may not only result in feelings of strength (increased confidence), but feelings of failure and self-blame, if the individual fails to achieve his/her goal. Such beliefs are likely to impact negatively on the individual's affect, potentially exacerbating a biological vulnerability to mood fluctuation and leading to depressive symptoms (e.g. low mood, slowed thinking), further reinforcing beliefs relating to success and failure.

1.5.4.1 An Integrative Cognitive Model of Mood Swings and Bipolar Disorders

Of particular interest to this study is the integrative model proposed by Mansell *et al.* (2007). The model is derived from several theories relating to bipolar disorder considering psychological and biological processes involved in the development and maintenance of manic and depressive episodes.

The model draws on biopsychosocial theories such as the BAS (Gray, 1972, 1994). The suggestion is that individuals vulnerable to bipolar disorders exhibit sensitive and reactive regulatory systems, which influence expression of extreme mood

variation. More recently, in line with dysregulatory theories, findings of goal attainment life events and dysfunctional beliefs related to extreme goal attainment, perfectionism and need for approval (e.g. Johnson, 2005; Johnson *et al.*, 2000; Johnson & Carver, 2006; Lam *et al.,* 2004), are considered as possible factors influencing the exacerbation of manic symptoms. Other biological theories such as disruption in circadian rhythm are also implicated in the model. This suggests that disruption of social routines (as consequence of pharmacological/environmental/ interpersonal events), could lead to disruption in neurological symptoms, which further exacerbate or trigger bipolar type symptoms (e.g. psychomotor agitation). The work of Jones (2001) is also considered, who proposes that maladaptive cognitive appraisal of changes to biological systems, could influence the individual's behaviour, further disrupting biological systems and exacerbating manic symptoms. Mansell *et al.* model also incorporates insights from the work of Bentall and colleagues (e.g. Lyon et al., 1999) in relation to ruminative style coping (found in unipolar but also bipolar depressed) and other maladaptive coping styles (e.g. behavioural risk-taking) likely to interact with mania. Finally, the model incorporates findings of information processing biases to condition specific stimuli as shown in anxiety disorders (previously mentioned) and more recently psychosis (Morrison, 2001), as well as cognitive biases found in both mania and depression, which may have subsequent effects on mood and behaviour.

The integrative cognitive model is said to be applicable to other clinical disorders presenting with mood fluctuation and is proposed to be dynamic, driven by the individual, and can be entered at any point (accounting for variation in mood at

different time points). The central propositions of Mansell *et al.* (2007) model are presented in appendix 1 and can be summarised as follows. A triggering event, which may be varied (e.g. drinking too much caffeine), leads to a change in an internal state (e.g. increased physiological arousal). The change of internal state might be a change in mood (affective), arousal (physiological), cognition (e.g. racing thoughts) or perceived behaviour. Bipolar individuals can experience fluctuations in internal states prior to an episode, which may increase the likelihood of cognitively- driven cycles of escalating symptoms. Changes in internal states experienced by individuals with bipolar disorder are thought to be on a continuum of mood fluctuations in other clinical disorders and non-clinical populations. Alone, these changes are not necessarily enough to lead to increases in manic or depressive symptoms. The model predicts that escalation of other mechanisms (e.g. appraisal and behaviour change) are required to influence extreme mood change that is qualitatively different (yet arise from a similar dynamic cycle) to those that contribute to minor mood swings. At extreme states of mood and arousal information processing might become biased considerably further to contribute to a persons difficulty stepping outside the cycle.

Changes in internal states are seen as intrusions into awareness. It is the interpretation (appraisal) of these changes, which are key in influencing behaviour, mood state and coping. In the model, interpretation of the internal state change is characterised by extreme negative or positive personal meaning (self-relevant appraisal). Individuals may hold a number of (and potentially conflicting) self-relevant appraisals (Mansell *et al.*, 2007). Catastrophic interpretations are based on limited evidence rather than a rational and contextualised analysis of experiences,

and often relate to an imagined possible self, as driven by experiences stored in memory. Evidence to support the role of self-relevant appraisal has recently emerged (e.g. see Mansell, 2006; Jones, Mansell and Waller, 2006).

As indicated, appraisal of intrusions (internal state change) may further influence an individual's behavioural response, which in turn, may be appraised and evaluated in line with underlying beliefs (e.g. rumination as an effective method of coping with depressive feelings). The resulting behaviours could present as either ascent (e.g. goal seeking/ risk-taking behaviour which contribute to heightened activity), or descent behaviours (which contribute to a reduction in behaviour such as withdrawal). Appraisal of behaviour can have further influence on future coping via memory processes (see e.g. Mansell & Lam, 2004). It is predicted that vulnerable individuals may struggle to access information regarding past experiences and so may catastorphise and misinterpret changes to internal states instead of applying a more balanced perspective based on information relating to how they coped in the past. Finally, appraisal of internal states and consequent behaviours are likely to be influenced by a variety of factors such as: personal beliefs regarding self and others; procedural beliefs regarding information processing (e.g. advantages and disadvantages of rumination); beliefs regarding physiological and affective states (e.g. positive and negative beliefs regarding depression); and beliefs affected by past experiences.

1.6 Study rationale

In the context of the above reviewed research and theories, the overarching aim of this study is to develop material to further explore cognitive styles in relation to bipolar spectrum disorders. It is hoped that the study will contribute to further understanding the disorders with regards to the theoretical propositions and to provide foundations for future research in this under-researched area of investigation.

Although not explicitly stated in Mansell *et al.* (2007) model, the following logical assumptions are considered in view of the proposed components of the model and evidence reviewed thus far, relating to cognitive styles. Firstly, the model suggests that individuals vulnerable to extreme mood fluctuations are likely to experience changes in internal states as intrusions into awareness and are more likely to give extreme personal meaning to such internal changes (self-relevant appraisal). It is therefore reasonable to predict that such vulnerable individuals are also likely to exhibit a heightened sensitivity (e.g. similar to hypervigilance in anxiety states) to changes in internal states compared to non-clinical groups. Such heightened sensitivity/awareness could be demonstrated by investigating information processing bias towards internal-state relevant stimuli, compared to neutral stimuli. Attentional biases to internally relevant information (e.g. cognitive/ physiological changes) have been found to play important roles in the onset and maintenance of anxiety disorders and psychosis (Clark, 1999; Wells & Mathews, 1994; Morrison, 2001). Attentional bias to salient information (not only to internal information) has also been found in emotional disorders, particularly with regards to mood-congruent bias in unipolar depression (e.g. see Mathews & MacLeod, 2005) and is emerging in bipolar

disorders. Furthermore, this vulnerability can also be observed in non-psychiatric populations (e.g. Asmundson *et al.,* 1997).

If, as the above model proposes, individuals vulnerable to bipolar disorder place significant personal meaning (self-relevant appraisal of information) on internal changes, then it is reasonable to predict that they may be more likely to rate internally relevant stimuli as more relevant to them than neutral stimuli. Evidence to support this notion arises from findings in self-referent information processing styles found in bipolar and unipolar disorders.

Self-reference has been defined as the process by which a stimulus is considered in terms of the extent to which in applies to the individual (Teasdale & Barnard, 1993). This phenomenon has been well evidenced in unipolar depression with regards to patients exhibiting self-referent bias for negatively toned information. In bipolar disorders, similar investigations are being done extending on cognitive theories for unipolar depression. For example, Lyon *et al.* (1999) used a self-referent incidental recall task (SRIRT) on a group of manic, depressed bipolar and normal controls (using positive, negative or neutral trait adjectives). They found that the manic group endorsed more positive than negative trait words (like participants in the normal group) and later recalled more negative than positive words (more like the depressed group), illustrating self-referent processing.

In a similar vein, Reilly-Harrington *et al.* (1999) assessed self-referent encoding among undergraduates with a lifetime diagnosis of either bipolar spectrum disorder

or unipolar depression. On a self-referent task (also using trait adjectives), they found self-referent encoding of negative information interacted with negative events to predict increases in depressive symptoms and manic symptoms.

To date, much of the limited research in bipolar disorder has focused on investigating information processing bias to emotionally laden information in an attempt to establish maladaptive cognitive styles in relation to mood (e.g. positive/negative information). However, from reviewing the literature, there appear to be no studies investigating attention or information-processing bias to internal state relevant information in bipolar disorder. Establishing the prevalence of such cognitive vulnerability and exploring the proposition of self-relevant appraisal of internal state information would further support Mansell *et al.* (2007) model and could provide valuable information regarding clinical implications in the treatment of bipolar disorder. It is considered that self-referent bias (particularly with regards to depressive related information) is a result of pre-existing cognitive biases (e.g. underlying negative beliefs). In this thesis, the role of self-relevance is only tentatively and preliminarily explored in relation to internal states. No conclusions may be drawn with regards to the causality of any of the following findings.

The current study therefore aims to develop material to support future investigations of cognitive styles in a bipolar disorder sample. Given that this has not been explored previously, this study is an initial step of developing material to test such hypotheses.

1.6.1 Objectives

The objectives of the study may be summarised as follows:

Primary objective

To develop material (a word list), related to internal state information (e.g. cognition, physiology), that is not confounded by emotion, to be used in future studies investigating cognitive styles in bipolar disorder in cognitive tasks such as an adapted Stroop or dot-probe task (using internal and neutral words instead of conventional emotional words). Therefore:

1. Is it possible to generate a list of internal state words that are rated as highly internal, and low in emotion on a likert-type scale (not confounded by emotionality) and matched (for length and frequency of occurrence in the English language) with neutral words rated as low internal state and emotional on likert-types scales.

Secondary objective

As described earlier, Mansell *et al.* (2007) integrative cognitive model, suggests that individuals vulnerable to bipolar disorder place extreme personal meaning on changes to their internal state (e.g. physiological changes). Furthermore, evidence has shown that self-referent bias to e.g. emotionally laden stimuli (whether positive or negative) can be observed in unipolar depressed and bipolar individuals. This thesis considers whether it is possible to further validate the internal state word list and tentatively test a predicted hypothesis that a relationship will be observed

between participants' scores on measures of mania and depression and ratings of self-relevance of internal state stimuli (words), but not neutral stimuli. This would support the prediction that that those who present with features of bipolar spectrum disorder (as measured by scales of mania and depression) are likely to rate internal state words as more relevant to them than neutral words. The following is therefore predicted:

2a. Participants' scores on measures of mania/ hypomania will correlate with their ratings of self-relevance on internal but not neutral words.

2b. Participants' scores on measures of depression will correlate with their ratings of self-relevance on internal but not neutral words. (See pp. 100-101 for a full list of the individual hypotheses).

CHAPTER 2: METHODOLOGY

2.1 Design

A quantitative methodology was used to investigate the aims of the current study. A cross-sectional design, using participants selected from a non-clinical, student population, was used to construct word lists that operationalised the variable of internal state versus neutral word, whilst controlling for the confounding effects of emotional content of the words. All words were matched for word length and frequency in the English language based on previously published sources. The second part of the study also applied a cross-sectional design and involved testing predicted correlations between the participants' ratings of self-relevance of internal state words with a variety of self –report measures relevant to the study of bipolar disorder.

The study firstly aimed to investigate whether it was possible to generate a list of words that were highly internal, not confounded by emotion and matched (for length and frequency of occurrence in the English language) with neutral words. The first stage of the study involved identifying a list of words that were considered by the researcher (and an independent rater) to be related to internal states (cognitive and physiological) using a number of resources (e.g. symptoms checklists for mania and depression). After the development of a preliminary internal state word list, the words were matched to what was considered by the author (and an independent rater) to be neutral words (not reflecting emotions or internal states) matched for length and frequency of occurrence in the English language. Participants were then asked to rate

all the words (both internal and neutral) on a 7 point likert-type scale for the extent to which they considered both internal and neutral words to reflect an internal state, an emotional state and also how relevant or meaningful each word was to them.

Following the above data collection, the researcher identified (using ratings on internal and emotional scales), a list of words, which were rated as highly related to an internal state (high scores on the internality scale) and not confounded by emotion (low scores on the emotional scale) based on their modal response. The modal score was used in this study to reflect the most common response. This was to account for extreme responses in the sample, which may bias the average response if using the mean. Using SPSS for windows (version 16.) internal state words were selected on the basis of those meeting criteria for a modal response of ≥ 6 for internal ratings and ≤ 4 on emotional ratings. Once the internal words were identified, the modal response was also used to check that previously matched neutral words met criteria for low ratings on the internal or emotional state scale (modal rating of <4). In order to ensure the final word list reflect internal states, the author set a high modal rating for ratings on the internal scale and a moderate rating for ratings on the emotional scale. As no previous word lists relating to internal states were available, the author opted for a modest inclusion/ exclusion criteria for word selection. Previous studies using similar methods to develop word lists, set the criteria for inclusion at a lower mean rate of 4 or more on a 7-point likert scale) (e.g. Derry & Kuiper, 1981 or Gotlib *et al.*, 2005)

A second aim of the study was to further validate the list of highly internal state words not confounded by emotion (low scores on emotional scale) and matched neutral words and explore the tentative hypothesis relating to self-relevance as described in the previous chapter (see rational pp. 66-68). The ratings of self-relevance associated with the final list of internal state words and matched neutral words were compared to participants' scores on measures of depression and mania. A series of correlational analysis were employed, using non-parametric statistics (Spearman's rho). The significance level for the results was set at a level of $p < .05$ following convention in psychological research.

2.2 Ethical considerations

The current study was reviewed and approved by Lanarkshire NHS Research Committee and Lanarkshire Research and Development Department (appendix 2-3). Given the nature of this study (the researcher did not have face to face contact with the participant), every effort was made to provide participants with details regarding confidentiality and accessing support in the unlikely event of them experiencing any distress during completion of the scales and measures (appendix 4).

To minimise the likelihood of participant distress and to reduce response burden, the self-report measures assessing mood used in this study have been previously applied to clinical and research settings, with no published reports of difficulties[1]. Participants were advised that they did not have to take part in the study if they did

[1] The Altman Self-Rating Mania Scale (ASRM; Altman *et al.,* 1997) is a relatively new measure of mania and is therefore not widely used. However preliminary analysis by the Altman and colleagues has shown good psychometric properties and no reported distress as a result of completing this measure.

not wish to and were reassured that their responses would remain anonymous and be stored confidentially within the NHS. A separate consent form was not deemed necessary and the researcher opted to specify that in completing the pack participants were providing consent for their responses to be included in this study.

2.3 Power calculation

Given that no previous research has attempted to develop a list of internal state words for use with individuals with bipolar disorder, or explored self-relevance ratings in relation to these words, it is not possible to estimate power from a previous study applying the same design with a similar sample. However, to estimate the effect size and sample size required to meet assumptions of power, studies using word lists in investigating information-processing bias to stimuli were consulted, in particular those investigating such cognitive styles in relation to individuals with bipolar disorder. Most previous studies use cross-sectional methods to identify differences between the groups, rather than comparing variables using correlational analysis as in this study. However, two previous studies (Jongen *et al.,* 2007 and Gotlib *et al.,* 2005) exploring information-processing biases in individuals with bipolar disorder compared to healthy controls, have found an effect magnitude of a moderate to large effect size. Using Cohen's (1992) statistical power tables this would equate to .50 - .80 looking at differences between means. Based on these prior findings (considering the differences in design) the current author opted to be cautious and predict a moderate effect size for this study. For an estimated moderate effect size, for correlational analysis, Cohen (1992) recommends a sample size of 85. Furthermore, previous studies constructing word lists for clinical populations using

student samples to identify the words, use smaller sample sizes than that used in the current study (e.g. Derry & Kuiper, 1981; Lyon *et al.,* 1999). Also, a recent French article by Besnier *et al.* (2008), which is solely focused on developing a word list for use in a Stroop test (similar to the main aim of the current study), uses a sample of only 25 clinicians to rate emotional valance of words.

2.4 Participants

2.4.1 Sample description

Participants were a sample of 86 students recruited from the University of Edinburgh. A student sample was deemed more accessible to the author and has also been used extensively in the development of material (e.g. word lists) to assess cognitive styles, particularly information processing bias to mood-congruent information (e.g. Gotlib *et al.*, 2005). It was also deemed necessary to carry out a preliminary investigation with a student sample to further validate the word list prior to using such material to test particular hypotheses in a bipolar clinical sample.

With regards to the predicted hypotheses, it was considered appropriate to use a student sample to carry out preliminary investigation of hypotheses relating to self-relevance of internal state words on the basis of the following:

As indicated earlier (pp.6-9) bipolar disorder is being conceptualised within a broader clinical spectrum (e.g. see Akiskal 1996; Akiskal *et al.*, 2000). It is thought that 'soft' bipolar presentations are common in the general population, and may exist on a continuum with clinical bipolar disorder (Akiskal *et al.,* 2000). The possibility

of a student sample exhibiting features consistent with bipolar spectrum disorders is considered on the basis of findings of softer bipolar presentations being observed in non-clinical populations (e.g. students). For example, Placidi *et al.*, (1998) and Depue *et al.,* (1981) report on evidence of cyclothymic temperaments found in student samples, and suggest such features may pre-dispose individuals to developing affective disorders at a later date.

Furthermore, previous studies have used student samples to explore dysfunctional cognitive styles hypothesised to be important in development and maintenance of manic and depressive symptoms in bipolar disorder. For example, Reilly-Harrington *et al.* (1999) used a student sample in their study to test predictions relating to cognitive vulnerabilities in bipolar disorder (including self-referent information processing) and interaction with life events. They employed a student sample to demonstrate findings in a naturalistic, largely untreated sample. They suggest that their sample may represent individuals early in the life course of their bipolar and unipolar mood disorders and draw on findings of long delays between onset of symptoms and treatment seeking individuals with bipolar and unipolar mood disorders (e.g. Goodwin & Jamison, 2007). However Reilly-Harrington *et al.* (1999) selected their sample on the basis of clinical criteria using the SADS-L. The design of the current study did not permit the use of clinician administered diagnostic measures. Additionally, no information was sought regarding participants' current or past psychiatric status or treatment. Other studies considering information processing bias have also used student samples, such as Bentall and Thompson (1999) who explored information processing bias in relation to mania/ hypomania in

hypomanic individuals and Smallwood (2007) considered the role of self-referent information processing in student samples presenting with dysphoric symptoms.

With the above findings in mind, it was deemed appropriate to use a student sample in this study, to meet both primary and secondary objectives as described on pp. 69-70.

Participants were 63 females (73.3 per cent) and 23 males (36.5 per cent). The mean age of the sample was 27.10 years (SD = 7.77 years; data from two participants were missing). Twenty seven (33.3 per cent) of the participants were undergraduate students and 54 (66.7 per cent) were postgraduate students (5 participants data for this question were missing). No data were collected regarding current or past psychiatric or medical history of participants.

2.4.2 Recruitment of the sample

Students were recruited via the School of Health in Social Science and The School of Philosophy, Psychology and Language Sciences at the University of Edinburgh, consisting mainly of students studying psychology at some level. To meet sample level requirements, some students were approached directly and asked to complete measures by the researcher at the University of Edinburgh. Students were notified of the study and asked to participate via group e-mails sent by academic staff at the University. To enhance recruitment, reminder e-mails were sent and students were also reminded before or after lectures.

2.5 Word list

A set of 36 words consisting mainly of adjectives, were selected on the basis of their association to internal states (cognitive and physiological not emotional). It was intended that the words would be relevant for individuals with bipolar disorder. As no previous word list relating specifically to internal states could be identified in the literature, a number of alternative sources were used to construct a list of potential internal words. For example, the symptom checklist devised by Perry *et al.* (1999) and texts relating to bipolar disorder such as Goodwin and Jamison (2007), Lam *et al.* (1999), Miklowitz and Goldstein (1997). Given some of the internal words also related to physiological state, anxiety measures illustrated in Antony *et al.* (2001) 'Practitioner guide to empirically based measures of anxiety', was also consulted.

The researcher identified an initial list of 87 words. In order to control for researcher bias in the selection process, the researcher's supervisor also independently examined the 87 words. Words were selected on the basis of those considered as most related to internal (but not emotional) states. Final list of 36 internal state words were agreed upon. It was considered that by including more words in this preliminary study, the researcher would increase the chances of identifying a substantial list of highly internal words from students' ratings to use in future research. The final list of 36 internal state words was matched with a list of 36 neutral words (mainly consisting of nouns) for both length and frequency of occurrence in the English language (Thorndike & Lorge, 1944; Leech *et al.*, 2001).

To reduce the impact of order effects, the words were randomly arranged (in order) by someone independent of the study. The final list of 72 neutral and internal state words were therefore randomly ordered within each rating and across the three ratings (internal, emotional and self-relevance).

2.6 Rating scale construction

Ratings of internal state, emotionality and self-relevance were developed using a 7-point likert-type scale as used in previous research for measuring other constructs in word lists (e.g. Gotlib *et al.,* 2005; Derry & Kuiper, 1981; Emmerich, 1979; Pavio *et al.,* 1968). It is also considered that the more points a scale has the more reliable it is likely to be, though too many would result in diminishing return, with most people struggling to discriminate beyond 7 points (Robson, 1993). End points were labelled as 1 = not at all internal/emotional or self-relevant (depending on the scale being rated) to 7 = extremely internal/emotional or self-relevant.

Each word was aligned to a rating and presented on an A4 sheet of paper. Words were presented to the left-hand side of the sheet with ratings from 1-7 aligned from left to right of the word. 20 words (both internal and neutral) were presented on the first page of the particular rating, followed by 30 on the second page and finally 22 on the last page.

At the top of each page, corresponding to the requested ratings for the 72 words, a definition of the construct being measured was provided, with brief instructions (refer to appendix 5 to 7). As an additional precautionary measure, the order of

presentation of ratings within the pack, were also randomised as order A, B or C. This meant that some participants would rate the words on internal, then emotional and then self-relevance scales (order A), whereas others would rate words on emotional, then self-relevance and then internal scales (order B) and finally some would rate words on self-relevance, then internal and then emotional scales (order C).

2.7 Demographic information

Information related to participants' age, gender and degree level was collected (appendix 4)

2.8 Questionnaires

2.8.1 The Altman Self-Rating Mania Scale (ASRM: Altman *et al.*, 1997)

Given the limited availability of self-rating scales for mania (perhaps due to the controversy regarding the reliability of self-report during manic episodes with regards to insight into symptoms). Altman and colleagues attempted to develop a brief self-report measure, to enable clinicians and researchers alike to screen for manic symptoms (Altman *et al.,* 1997).

The ASRM was developed and validated with a sample of 105 psychiatric inpatients with mixed diagnosis (including major depression, bipolar depressed and bipolar disorder) admitted to an adult research unit. The original scale consisted of 14 items, which were sub-categorized into those representing mania, psychosis and irritability.

Following analysis of their findings, the authors found items in the psychotic and irritability/ liability factors failed to discriminate between manic and non-manic participants and so were removed from the final measure (Altman *et al.*, 1997). The final version of the ASRM therefore consisted of five items identifying manic symptoms (appendix 8). Within each item, five statements are presented and respondents are asked to select one of the statements that best describes them. Symptoms are rated from 0 (absent) to 4 (present to severe). A score of 5 or less would suggest absence of manic symptoms and a score greater than 5 would suggest the presence of manic symptoms with sensitivity and specificity scores (at this cut-off) reported at 85.5 per cent and 87.3 per cent respectively.

The ASRM scale has also been compared to the Clinician Administered Rating Scale for Mania (CARS-M; Altman *et al.,* 1994) and the Mania Rating Scale (MRS: Young *et al.,* 1978) as a measure of construct validity (Altman *et al.,* 1997). Positive significant correlations were established between the ASRM and MRS ($r = .718$, $p = <.001$) and between the ARSM and CARS-M ($r = .766$, $p = <.001$). Test-retest reliability for the ASRM was also measured on a sub-group of their sample, revealing a significant correlation between both baseline ratings ($r = .86$, $p = <.001$).

To further evaluate the psychometric properties of ASRM, Altman *et al.,* (2001) compared the performance of this measure with two other self-rating scales used to identify mania, the Internal State Scale (ISS; Bauer, 1991) and the Self-Report Manic Inventory (SRMI; Shugar *et al.*, 1992). The sample in this study consisted of a group of patients with acute mania, who were administered the scales pre and post

treatment. For sensitivity analysis, the measures were compared to the Clinician-Administered rating Scale for Mania (CARS; Altman *et al.,* 1994). The ARSM was found to show most sensitivity in detecting acute symptomotology (93 per cent), however specificity of the scale was poor compared to the two other self-rating measures with ASRM showing specificity rating of 33 per cent compared to 47 per cent on ISS and 46.6 per cent on SRMI. The authors suggest poor specificity results relate to the cut-off score on the CARS-M for mild symptoms, indicating when this is increased; specificity rises to 82 per cent (Altman *et al.,* 2001).

Although the scale is relatively new and does not appear to be widely used in the literature, it shows promising psychometric properties and has been compared relatively favourably to other self-rating measures of mania. It also has the advantage of brevity and was therefore selected for use in this study. The ASRM was also recommended for use in this study by an expert in the field of bipolar disorder research (W. Mansell, personal communication, 5th December 2007)

2.8.2 The Hospital Anxiety and Depression Scale (HADS: Zigmond & Snaith, 1983)

The HADS self-report scale was originally developed to identify 'possible' or 'probable' anxiety and depression in patients seen in general medical outpatient clinics. As the ASRM focuses on identifying manic symptoms, a measure of depression was necessary for the current study. The HADS was selected as it enables identification of depressive but also anxiety symptoms. Given the high co-morbidity between the two disorders. The majority of the depression sub-scale items from the

HADS assess for anhedonia, hence making it less likely that responses would be associated to physical illness (Zigmond & Snaith, 1983).

The HADS assesses anxiety and depression over 14 questions, which are equally distributed evenly between the two sub-categories. Scores for anxiety and depression are independent of each other ranging from 0-21 (appendix 9). Respondents are asked to rate on a scale of 0 to 3, which response best reflects how they have been feeling over the past week from four possible responses per item. Recommend cut-off scores of 8 or above identify 'possible' cases of anxiety or depression and 11 or above for 'probable' cases.

A recent literature review of 747 studies by Bjelland *et al.* (2002) provided good support for the psychometric properties and diagnostic efficacy of this scale. Most of the studies reviewed in their article supported a two-factor structure. Various studies have examined the relationship between the two constructs (anxiety and depression) revealing significant correlations (e.g. Bramley *et al.,* 1988; Aylard *et al.,* 1987; Zigmond & Snaith, 1983).

The psychometric properties of the HADS have been explored in a number of studies with various populations cross-culturally (Bjelland *et al.,* 2002; Herrmann, 1997). Sensitivity and specificity findings for the HADS are estimated at 0.80 for both sub-scales when the cut-off is set at 8 or above (Bjelland *et al.*, 2002). Similarly Lowe *et al.,* (2004) report sensitivity ratings of 85 per cent using cut-off points recommended for identifying major-depressive disorder and specificity rating of 76 per cent using

the Structured Clinical Interview for DSM-IV (SCID) as the criterion standard. They also conclude that the HADS (along with the two other self-report measures examined in this study) showed excellent internal consistency and good criterion validity (Lowe *et al.,* 2004). There seems to be no generally acceptable cut-off score for the HADS, with some studies lowering the cut-off score recommended by the original authors. Herrmann (1996) reports good test-re-test reliability scores of r> 0.80 and suggests that although anxiety and depression sub-scales of the HADS correlate highly together (0.63), they also correlate well with other measures of anxiety and depression independently.

Studies measuring concurrent validity, have found when comparing the HADS with the BDI a significant correlation of approximately .73 for the total score (anxiety and depression) if identified. When comparing this measure to the STAI significant correlations of between .68 to .71 for the total depression and anxiety score are found. Of the studies exploring the internal consistency of the scale, Cronbach's alpha coefficients all exceed .60 with a mean of .83 for the anxiety sub-scale and a mean of .82 for the depression sub-scale (Bjelland *et al*., 2002).

With regards to using the HADS with a student sample, Andrews *et al.* (2006) found that the HADS demonstrated good sensitivity in identifying caseness of depression and anxiety against the DSM-IV. In exploring various cut-off points, the scale seemed better at identifying non-cases of depression than anxiety (specificity). In comparing the HADS to interview assessment using the SCID, the HADS showed poor concurrent validity (this does not support the findings of Bjelland *et al.,* 2002).

The authors conclude that identifying depression using self-report measures may be easier than identifying anxiety.

2.8.3 The Internal States Scale (ISS: Bauer et al., 1991)

The ISS was selected for the current study as an additional measure for identifying mania and depression. Unlike the ASRM and HADS this allows for screening of both symptoms.

The internal state scale is a self-report questionnaire consisting of 15 items, which are divided into four empirically derived sub-scales: Activation (ACT); Well Being (WB); Perceived Conflict (PC) and Depression Index (DI) (refer to appendix 10). The ACT and WB sub-scales have been used together to classify euthymia, mania/hypomania or depression and the ACT and DI sub-scales are said to correlate well with clinician measures of mania and depression (Bauer *et al.,* 2000). The questionnaire uses a 100 mm visual analogue scale for each item with labels at either end 'Not at all/ Rarely, at one end (0) and Very much so/ much of the time, at the other end (100). Respondents are asked to place an 'X' on the line to indicate how they have been feeling for the preceding 24 hours. This measure is considered a useful tool if clinician administered measures are not feasible, as in the current study.

In their original study, Bauer *et al.,* (1991) provided cut-off scores for classifying individuals as euthymic (score of <200 on ACT), depressed (score of <125 on WB), or manic/hypomanic (score of ≥ 200 on ACT). However, they did not account for mixed states. The author and his colleagues later revised the scoring algorithm in a

sample of veteran outpatients with bipolar disorder across a number of medical centres in the United States (Bauer *et al.,* 2000). The ISS was shown to discriminate between different mood states, as found in the original study. However, only a moderate agreement was found between physician defined mood states and the ISS discrimination of mood states. The authors suggest this may relate to the control group comprising euthymic participants and not healthy controls as in the original study (Bauer *et al.,* 2000). They make recommendations for updating the scoring algorithm to account for mixed states as presented in table 2.1.

Table 2.1 **ISS-Revised scoring algorithm (Bauer *et al.,* 2000)**

Mood state	**ACT score and WB score**
Euthymic	<155 ≥ 125
Manic/ Hypomanic	≥ 155 ≥ 125
Mixed	≥ 155 < 125
Depressed	<155 <125

With regards to the current study, the main aim was to use this scale to measure manic and depressive symptoms, thus focusing on scores related to the ACT and DI sub-scale. In their original study, Bauer *et al.,* (1991) report significant correlations of the ISS-ACT with the Young Mania Scale ($r= 0.55$, $p < 0.03$) and between the Hamilton Depression Rating Scale and the ISS-DI ($r=.084$, $p<0.0001$)

The ISS has been compared to the Self-Report Manic Inventory (SRMI: Shugar *et al.,* 1992) and the Young Mania Rating Scale (YMRS: Young *et al.,* 1978), with a

sample of 20 rapid cycling bipolar patients (Cooke *et al.,* 1996). All three scales were significantly correlated with each other at $P < 0.05$. The ISS revealed a small correlation with YMRS ($r = .44$, $p = .025$) and a modest correlation with the SRMI ($r = .58$, $p = .003$). Correlational analysis revealed stronger correlations between the ISS and SRMI then either of the self-report measures and the YMRS. The authors conclude from their findings that the ISS and SRMI were valid measures to use for identifying the severity of manic/ hypomanic symptoms.

2.9 The final pack

The final pack distributed to participants included, an information sheet, briefly describing the study and providing information regarding support services (in the unlikely event of the participants experiencing any distress from completing the scales), followed by the instructions for completing the ratings scales (adapted from Pavio *et al.*, 1968) refer to appendix 4. Next, the rating scale for internal, emotional and self-relevance of all the words were presented independently according to three orders of presentation (A, B & C) and ending with the three questionnaires in the following format, ASRM, ISS then HADS. The rationale for placing the questionnaires at the end of the ratings was to avoid priming of emotional stimuli or possible evocation of a particular mood state or change in mood.

2.10 Procedure

146 packs were distributed to postgraduate students at the School of Health and Social Sciences by placing randomly ordered packs (46 order A, 49 order B and 51 order C) in their own filing slot in the trainee room. An empty labelled box was

placed at the top of the filing cabinet in the trainee room and in the administrator's office to return completed packs. Group e-mail was sent to all postgraduate students notifying them of the study and asking them to participate and also later reminding them of the study. The researcher collected completed packs personally over a period of 1-2 months. Some of the postgraduate students requested electronic version, which was sent via e-mail and returned to the researcher's work address.

With regards to the psychology undergraduate students, 68 packs equally distributed according to the order of presentation, were placed in the library of the School of Philosophy Psychology and Language Sciences. A university member of staff e-mailed both undergraduate and post graduate students to ask them to participate in the study by completing a pack in the library. As above, a labelled empty box was left in the library along with the packs to return completed packs and the researcher collected the competed packs in the same manner as above. To maximise numbers, the researcher later opted to approach 20 students at the University of Edinburgh personally, asking them to complete the measures and return them immediately.

The total number of packs distributed via the various methods amount to 234. Of those distributed 86 were returned, giving a total response rate of 36.7 per cent.

CHAPTER 3: RESULTS

3.1 Sample characteristics

86 participants were included in the study, 63 females (73.3 per cent) and 23 males (36.5per cent). The mean age of the sample was 27.10 years (SD = 7.77 years; data from two participants were missing). 27 of the participants (33.3 per cent) were undergraduate students and 54 (66.7 per cent) were postgraduate students.

3.2 Missing data

Any participants with missing data were removed from the analysis (automatically through SPSS). One participant's data was removed completely from the final analysis when identified as an outlier with extreme scores. This participant's score appeared to be skewing the data further and was not in line with the majority of other participants' responses.

3.3 Primary analysis

3.3.1 Selection of words

The main aim of the current study was to determine whether it is possible to generate a list of highly internal state words (rated high on the internal scale), not confounded by emotion, matched with a list of neutral words. Descriptive analysis for ratings on internal and emotional scales for all internal state words may be found in appendix 11 and for matched neutral words in appendix 12.

The words meeting criteria for being highly related to internal states and low in emotional content (using the modal response as the measure of central tendency) were selected by carrying out frequency analysis of participants' responses on internal and emotional ratings for internal words and based on the criteria described in the method section (refer to p. 72). This resulted in the identification of 10 internal state words (table 3.1) and 10 neutral words previously matched to internal words identified on the basis of low ratings on the emotional and internal scales and in accordance to the criteria describe in the method section (refer to p. 72). Descriptive analysis for the neutral words can be found in table 3.2. The final list of internal and matched neutral words are presented in table 3.3.

Table 3.1 Descriptive statistics for 10 internal state words

	Internal Ratings		***Emotional Ratings***	
Internal state word	**Mode**	**Mean (SD)**	**Mode**	**Mean (SD)**
Thought	7	5.88 (1.45)	1	3.36 (1.81)
Aware	6	5.57 (1.34)	4	3.56 (1.80)
Crave	7	5.36 (1.56)	4	3.97 (1.69)
Hunger	7	5.28 (1.56)	1	3.05 (1.75)
Drowsy	6	5.30 (1.42)	3	3.12(1.56)
Palpitate	7	4.52 (2.22)	1	2.99 (1.77)
Tired	7	5.46 (1.55)	3	3.60 (1.74)
Alert	6	5.48 (1.50)	3	3.53 (1.78)
Rational	6	5.39 (1.57)	1	3.27 (1.81)
Forgetful	6	5.28 (1.45)	1	2.93 (1.66)

Table 3.2 Descriptive statistics for 10 neutral words

	Internal ratings		*Emotional ratings*	
Neutral word	**Mode**	**Mean (SD)**	**Mode**	**Mean (SD)**
Measure	1	2.00 (1.50)	1	1.26 (0.64)
Spoon	1	1.16 (0.65)	1	1.12 (0.52)
Ledge	1	1.15 (0.47)	1	1.30 (0.72)
Monkey	1	1.28 (0.95)	1	1.47 (1.15)
Cavity	1	1.62 (1.22)	1	1.47 (0.94)
Boathouse	1	1.10 (0.51)	1	1.19 (0.68)
Cycle	1	1.77 (1.46)	1	1.55 (1.14)
Index	1	1.45 (0.97)	1	1.17 (0.58)
Stimulus	1	2.21 (1.72)	1	1.87 (1.52)
Tombstone	1	1.48 (1.15)	1	1.88 (1.63)

Table 3.3 Final lists of 10 internal state and matched neutral words

Internal state words	**Neutral words**
Thought	Measure
Aware	Spoon
Crave	Ledge
Hunger	Monkey
Drowsy	Cavity
Palpitate	Boathouse
Tired	Cycle
Alert	Index
Rational	Stimulus
Forgetful	Tombstone

Although the main aim of this study was to identify a list of internal state words that were highly internal and not confounded by emotion, the researcher also opted to identify a list of internal state words that were both highly internal and highly emotional matched with neutral words for length and frequency of occurrence in the

English language. To select these words, a similar procedure as described above was employed, however the selection criteria applied here was a modal response of ≥ 6 on the internal rating scale and a modal response of ≥ 5 on the emotional rating scale. Neutral words were selected using the same criteria as described previously (see p. 72). Descriptive analysis of all internal-emotional and matched neutral words for ratings on all scales can be found in appendix 11 and 12.

Of the original 36 internal words 14 (38.8 per cent) met the inclusion criteria for high scores on internal and emotional ratings (≥ 6 and ≥ 5 respectively). Descriptive analysis of the14 internal-emotional words and their matched neutral words for ratings on the internal and emotional scales can be found in Table 3.4 and 3.5 respectively.

Table 3.4 Descriptive statistics for 14 internal-emotional words

	Internality Rating			*Emotionality Rating*		
Internal word	**N**	**Mean (SD)**	**Mode**	**N**	**Mean (SD)**	**Mode**
Detached	86	5.36 (1.63)	6	85	4.68 (1.70)	5
Confused	86	5.86 (1.49)	7	86	4.86 (1.54)	5
Impulsive	85	5.29 (1.70)	7	85	4.46 (1.65)	5
Tense	86	5.59 (1.50)	7	86	5.33 (1.44)	5
Optimistic	86	5.49 (1.45)	6	86	5.00 (1.50)	5
Focused	86	5.71 (1.32)	7	86	3.50 (1.60)	5
Inspired	86	5.57 (1.72)	7	85	4.61 (1.55)	5
Vigilant	86	5.62 (1.36)	6	86	3.51 (1.76)	5
Urge	86	5.51 (1.49)	7	86	4.07 (1.82)	5
Pain	85	5.25 (1.52)	7	86	4.38 (1.92)	6
Suspicious	86	5.60 (1.72)	7	86	4.47 (1.55)	5
Indecisive	86	5.20 (1.47)	6	86	4.02 (1.69)	5
Uncertain	85	5.36 (1.55)	6	85	4.28 (1.65)	5
Pessimistic	86	5.27 (1.60)	6	85	4.89 (1.56)	5

Table 3.5 Descriptive statistics for 14 neutral words matched to internal-emotional words

	Internality Rating			*Emotionality Rating*		
Internal word	**N**	**Mean (SD)**	**Mode**	**N**	**Mean (SD)**	**Mode**
Molecule	86	2.62 (2.13)	1	86	1.13 (0.68)	1
Radiator	86	1.10 (0.34)	1	86	1.19 (0.54)	1
Blindfold	86	1.51 (0.97)	1	85	2.04 (1.48)	1
Diary	86	1.40 (0.91)	1	86	1.65 (1.31)	1
Flashlight	86	1.12 (0.39)	1	86	1.22 (0.64)	1
Flavour	86	2.28 (1.66)	1	85	1.84 (1.38)	1
Precious	86	2.42 (1.78)	1	86	3.19 (1.91)	1
Waitress	86	1.21 (0.70)	1	86	1.38 (1.02)	1
Hunt	86	1.66 (1.11)	1	86	1.95 (1.36)	1
Gold	85	1.59 (1.34)	1	86	1.40 (1.04)	1
Manuscript	86	1.21 (0.90)	1	86	1.33 (1.00)	1
Television	86	1.30 (0.77)	1	86	1.45 (0.93)	1
Indictor	86	1.47 (1.00)	1	85	1.27 (0.73)	1
Hummingbird	86	1.08 (0.28)	1	86	1.21 (0.69)	1

The final list of 14 emotional internal words and matched neutral words are presented in Table 3.6.

Table 3.6 Final list of 14 internal –emotional and matched neutral words

Internal Emotional Word	**Neutral Word**
Detached	Molecule
Confused	Radiator
Impulsive	Blindfold
Tense	Diary
Optimistic	Flashlight
Focused	Flavour
Inspired	Precious
Vigilant	Waitress
Urge	Hunt
Pain	Gold
Suspicious	Manuscript
Indecisive	Television
Uncertain	Indictor
Pessimistic	Hummingbird

3.4 Secondary analysis (Hypothesis related)

3.4.1 Validation of words

In order to further validate the above selected list of internal only and neutral words and conduct preliminary investigation using these words in relation to inferred hypotheses drawn from Mansell *et al.* (2007) integrative cognitive model and previous findings relating to self-referent cognitive styles in mood disorders, participants were also asked to complete three questionnaires related to mania and depression. The results of participants' total scores on each of these questionnaires were compared to their total ratings of self-relevance on the 10 identified highly internal and low emotional words and matched neutral words (as presented in table 3.3). The hypotheses proposed in this study regarding the relationships between these variables are explored using non-parametric correlational analysis (Spearman's rho).

3.4.2 Assessment of suitability for parametric analysis

To establish whether the data used in this study met the assumptions for using parametric statistics, the data were examined using histograms, box plots (including outliers), calculating the Z skewness and kurtosis and using Kolomogrov and Shapiro tests to assess the distribution of the data for all variables. The data selected for use in further analysis relates to the 10 internal only words and 10 matched neutral words meeting the criteria described in the method section (p.72).

The results of the above analysis are presented in appendix 13. With regards to participants' ratings on the emotional, internal and self-relevant scales for the 10 internal words, analysis revealed all normal distribution of scores not exceeding the recommended value of $> 1.96, p < .05$ (Field, 2005).

With regards to participants' ratings on the emotional, internal and self-relevant scales for the 10 matched neutral words, descriptive analysis revealed significant skew and kurtosis $> 1.96, p < .05$ and even at the increased criteria of $> 2.58\ p < .01$ value recommended for smaller samples (Field, 2005). Although kurtosis for internal ratings on the 10 matched neutral words was not significant at the lower value of $1.96, p < .05$.

The total scores for all participants on the three measures used in the study (ASRM, ISS and HADS) were also subjected to the above analysis, results of which can be found in appendix 14. The HADS anxiety and depression scores were explored

separately as were the four sub-scales on the ISS (Activation, Well-Being, Depression and Perceived Conflict). The data for the ASRM, HADS-Depression, ISS Activation, ISS perceived conflict and ISS depression were all significantly skewed at the value of >1.96 $p < .05$ and even at the increased value of > 2.58 $p < .01$. The data for the ISS Well-Being and HADS-anxiety showed a non-significant skew and kurtosis and hence would satisfy assumptions for parametric analysis.

Given the above findings relating to the distribution of the data, transformations were applied to the data in an attempt to correct for distributional problems and outliers. For positively skewed data, three different transformations may be applied depending on the level of skewness. It has been recommended for moderately skewed data (at a value of 1.96-2.33), square root transformation would be appropriate to use. For substantial skewness (value of 2.34-2.56) log transformation and for severe skewness (value of 2.56+) reciprocal transformation should be applied. The various transformations were applied to the data. By transforming the data using the relevant transformations and visually inspecting the results, using the same method as above (e.g. histograms, Z skewness and kurtosis etc..), improvements were noted in the distributions of some of the data, but not all.

On the whole, the transformations did not provide substantial changes to the distribution of the data to merit using parametric analysis. Hence non-parametric statistics using Spearman's rho was used to carry out a number of correlation analyses with the data, at an alpha level of $p < .05$ (assumed as the minimum criteria for establishing a significant result).

3.4.3 Descriptive analysis for hypothesis-related data

Participants were asked to rate on a 7-point likert type scale how relevant/meaningful each word (neutral and internal) was for them. A score of 1 would suggest that the word has no relevance/meaning to the individual and a score of 7 would suggest that the word is highly relevant/ meaningful to them. Participants' ratings for self-relevance on all internal and neutral words were first computed to produce new variables. This enabled the researcher to compare the total ratings of self-relevance for all the words with the total scores on all questionnaires. The descriptive statistics for the total self-relevance ratings on internal only and matched neutral words are presented below in table 3.7. Statistical analysis also confirmed that participants rated internal only words as significantly more self- relevant than neutral words.

Table 3.7 Descriptive statistics for self-relevance ratings for 10 internal state and matched neutral words

Outcome measure	**N=**	**Mean**	**Standard Deviation**	**Z**	**Asymp.Sig (2-tailed)**
Internal only words	83	43.83	11.07	-7.821	.000
Matched neutral words	83	21.40	10.10		

Z based on Wilcoxen Signed Ranks test

The results of participants' scores on measures of depression and mania are presented in the table 3.8. and are compared to recommended cut-off scores for each measure.

Table 3.8 Descriptive statistics for participants' scores on measures of mania and depression and clinical cut-off scores

Questionnaire	N	Mean (SD)	Mean (SD) in clinical samples	Clinical cut-off	Participants meeting clinical cut-off range
ASRM	85	4.42 (3.33)	Bipolar manic 9.1 (3.6)	Clinical = >5	11 at >5
HADS-D*	85	2.33 (2.23)	General population 3.68 (3.07)	'Possible' = ≥ 8 'Probable'= ≥ 11	12 at ≥ 8 0 at ≥ 11
ISS- ACT**	85	113.86 (86.62)	218.8 (137.1)		12 at ≥ 218.8
ISS-DI	85	33.74 (35.74)	78.0 (29.1)		10 at ≥ 78.0

* Hamer *et al.* (1991) testing the use of the HADS in a psychiatric sample recommended an optimal cut-off score ≥ 8 for detecting depression in a psychiatric sample. An optimal cut-off score of 10/11 was recommended for non-clinical samples (see Crawford *et al.*, 2001)

** For the purpose of this study the Depression and ACT sub-scale are used to measure symptom severity of manic/hypomanic symptoms and depression (as indicated appropriate by Bauer *et al.*, 1991), no cut-off criteria are available for these sub-scales the means and standard deviations of a clinical sample (bipolar) were provided in a later study by Bauer and colleagues (Bauer *et al.*, 2000) and are used here to draw comparisons to means and standard deviations of the sample used in this study.

3.4.4 Correlation analysis results for hypothesis-related data

Self-relevance ratings for internal only and matched neutral words were correlated (using Spearman's rho) independently with ASRM, HADS-D (depression) and two of the sub-scales of the ISS (Activation, and Depression) to tests the following hypotheses:

Hypothesis 1 (ASRM & Self-Relevance ratings)

a) There will be a significant relationship between participants' rating for self-relevance on internal state words and their scores on the ASRM (manic symptoms).

b) There will be no significant relationship between participants' ratings on self-relevance on the matched neutral words and their scores on the ASRM (manic symptoms).

Hypothesis 2 (HADS-D & Self-Relevance ratings)

a) There will be a significant relationship between participants' ratings for self-relevance on internal state words and their scores on the HADS-D (depression)

b) There will be no significant relationship between participants' ratings for self-relevance on matched neutral words and their scores on the HADS-D (depression)

Hypothesis 3 (ISS –ACT; ISS-DI & Self-Relevance ratings)

a) There will be a significant relationship between participants' ratings for self-relevance on internal state words and their scores on the ISS-ACT (manic/ hypomanic symptoms)

b) There will be no significant relationship between participants' ratings for self-relevance on matched neutral words and their scores on the ISS-ACT (manic/ hypomanic symptoms)

c) There will be a significant relationship between participants' ratings for self-relevance on internal state words and their scores on the ISS-DI (depression index)

d) There will be no significant relationship between participants' ratings for self-relevance on matched neutral words and their scores on the ISS-DI (depression index)

Table 3.9 represents the main findings of the correlation analyses (using Spearman's rho) between rating of self-relevance of the 10 internal and matched neutral words with measures of depression and hypomania/ mania.

Table 3.9 Correlation analyses between self-relevance ratings of 10 internal and neutral words with questionnaires sub-scales (using Spearman's rho)

Questionnaires /sub-scales	Word Type: Internal (n =83)	Word Type: Neutral (n=)
ASRM	$r_s = .356$, p = .001**	$r_s = .392$, p = .000**
HADS-D	$r_s = .219$, p = .046*	$r_s = .225$, p = .041*
HADS-A	$r_s = .370$, p = .001**	$r_s = .315$,, p = .004**
ISS-ACT	$r_s = .406$, p = .000**	$r_s = .467$, p = .000**
ISS-DI	$r_s = .136$, p = .221	$r_s = .155$, p = .162

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

Correlation analysis results for internal only and matched neutral words & ASRM

With regards Hypotheses 1a & 1b analysis of the data using Spearman's rho reveal a moderate, significant (at $p < 0.01$ level), positive correlation between ratings of self-relevance on internal words and mean ratings on the ASRM, as expected. However, a moderate, positive significant correlation was also found between ratings of self-relevance on neutral words and mean ratings on the ASRM, not as expected. Refer to appendix 15 for scatterplots representing these findings.

Correlation analysis results for internal only and matched neutral words & HADS-D

In relation to Hypothesis 2a analysis of the data using Spearman's rho revealed a small to moderate, significant (at $p < .05$), positive correlation between ratings of self-relevance on internal words and mean ratings on the HADS-D, as expected. However, a small to moderate, positive, significant correlation was also found between ratings of self-relevance on neutral words and mean ratings on the HADS-D, not as expected. Refer to appendix 16 for scatterplots representing these findings.

Correlation analysis results for internal only and matched neutral words & ISS-ACT & ISS-D

Correlation analysis between ratings of self-relevance and the ISS-ACT support hypothesis 3a, for a significant moderate positive relationship (at $p < .001$). However, not as hypothesised, a significant positive correlation of a moderate to large effect was also found for self-relevance ratings for neutral words and ISS-ACT at a value of $p < .001$.

No significant correlations were found between the self-relevance ratings for both neutral and internal words and the ISS-DI, thus rejecting hypothesis 3c but supporting hypothesis 3d. Scatterplots representing the above findings may be found in appendix 17 and 18.

3.5 Exploratory analysis

The results presented in this section are the outcome of exploratory analysis and are not associated with any predicted hypotheses.

With regards to the 14 internal-emotional words and matched neutral words, the researcher felt it would be interesting to examine the relationships between ratings of self-relevance of these words and scores on measures of affective state as shown above (ASRM, ISS-DI & ACT and HADS-D). It was considered this would enable comparison of results to the internal only words. No specific hypotheses were predicted in relation to these words, though it could be suggested that given previous research findings related to mood congruence (e.g. Lyon *et al.* 1999) perhaps participants' scoring higher on measures of mania or depression may be more likely to rate stimuli of emotional content as more relevant/ meaningful to them, than those scoring low on such measures.

As with the hypothesis driven analysis, the ratings of self-relevance for the internal-emotional words and matched neutral words were subject to the same assessment of suitability for using parametric statistics. For the 14 internal-emotional words ratings on the self-relevance and emotional scale were normally distributed (<1.96) but not

for ratings on the internal scale (>1.96). However, with regards to ratings on the emotional- internal and self-relevance scales for the 14 matched neutral words, descriptive analysis revealed significant skew and kurtosis of >1.96, $p < .05$ and even at the increased criteria of 2.58 $p < .01$ value recommended for smaller samples (Field, 2005).

In an attempt to normalise the distribution of the data, a number of transformations were applied (as previously described on p. 102-103). On the whole, the transformations did not make substantial changes to the distribution of the data to merit use of parametric analysis. Hence non-parametric statistics using Spearman's rho was used to carry out a number of correlational analyses with the data, at an alpha level of $p < .05$ (assumed as the minimum criteria for establishing a significant result).

3.5.1 Descriptive analysis results for exploratory data

The descriptive statistics for the total self-relevance ratings on internal-emotional and matched neutral words are presented below (see table 3.10). Statistical analysis also confirmed that participants rated internal –emotional words as significantly more self- relevant than neutral words.

Table 3.10 Descriptive statistics for self-relevance ratings for 14 internal-emotional and matched neutral words

Outcome measure	N=	Mean	Standard Deviation	Z	Asymp. Sig (2-tailed)
Internal-emotional words	82	50.53	38.0	-7.734	.000
Matched neutral words	84	29.0	11.68		

Z based on Wilcoxen Signed Ranks test

3.5.2 Correlation analysis results for exploratory data

Self-relevance ratings for internal-emotional and matched neutral words were correlated (using Spearman's rho) independently with the ARSM, HADS-A (anxiety), HADS-D (depression) and the four subscales on the ISS (Activation, Well Being, Perceived Conflict and Depression). For the purpose of this study, only the results from the ISS-ACT and ISS-DI will be reported here.

Table 3.11 represents the main findings of the Correlation analyses (using Spearman's rho) between ratings of self-relevance of the 14 internal-emotional and matched neutral words with measures of depression and hypomania/ mania.

Table 3.11 Correlation analyses between self-relevance ratings of 14 internal-emotional and matched neutral words with questionnaire sub-scales (using Spearman's rho).

Questionnaires sub/scales	Word Type: Internal Emotional (n =82)	Word Type: Neutral (n=84)
ASRM	$r_s = .294$, p = .007**	$r_s = .323$, p = .003**
HADS-A	$r_s = .331$, p = .002**	$r_s = .301$, p = .005**
HADS-D	$r_s = .273$, p = .013*	$r_s = .199$, p = .069
ISS-ACT	$r_s = .415$, p = .000**	$r_s = .407$, p = .000**
ISS-DI	$r_s = .192$, p = .085	$r_s = .118$, p = .286

** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)

Correlation analysis results for internal-emotional and matched neutral words & ASRM

Analysis of the data using Spearman's rho correlation for self-relevance ratings on the internal emotional words and ASRM revealed significant (at a level of <0.01) positive correlations of a small to moderate effect for self-relevance ratings of internal emotional words and mean scores on the ASRM (manic symptoms). Interestingly, significant positive correlation (of a moderate effect) was also found for the self-relevance ratings of neutral words compared to mean scores on the ASRM.

Correlation analysis results for internal-emotional and matched neutral words & HADS-D

Significant positive correlation was established between self-relevance ratings of the internal-emotional words and mean scores on the HADS-D (at a level of <0.05), but not when correlated to the neutral words.

Correlation analysis results for internal-emotional and matched neutral words & ISS-ACT & ISS-DI

As evident from Table 3.11 moderate to large effects were found between the self-relevance ratings of internal emotional words and neutral words with mean scores on the ISS-ACT sub-scale. A similar finding was evident between correlations of self-relevance ratings for neutral words with mean scores on the ISS-ACT.

With regards to exploring possible relationships between depressive symptoms and self-relevance ratings of internal emotional words, using the ISS-DI subscale, no significant results were found.

3.6 Summary of results

In summary, the results suggest that in line with the primary objective of this study, it is possible to identify a list of words which are considered to be highly related to internal states, not confounded by emotion (low on ratings of emotion) and matched to neutral words, (also not confounded by emotion or relating to internal states). The internal state and neutral words were also matched on important variables such as length and frequency of occurrence in the English language. As intended, the author

was successful in operationalising the variable of internal versus neutral in this material.

Unfortunately, the results of the correlational analyses do not support the predicted hypotheses and make it somewhat difficult to validate the list of internal state words identified. It was predicted that a positive relationship would be observed between measures of mania and depression and ratings of self-relevance on internal but not neutral words. However, findings suggest, on the whole, self-relevance ratings on both internal and neutral words correlated moderately with measures of mania and less so with measures of depression. Thus suggesting that as symptoms of mania and or depression increase, so do ratings of self-relevance for material presented, regardless of the content of material (neutral or internal state words). These findings are critically evaluated in the next chapter.

CHAPTER 4: DISCUSSION

The final chapter draws together the key findings, implications and conclusions of this investigation. It begins by reviewing the main findings and explores possible explanations for these within the context of the analytical framework and research questions developed in the introduction. The next section turns to possible clinical and theoretical implications of the research. The main limitations and strengths will then be discussed, before developing some tentative ideas for future research. The last section sets out a series of concluding comments.

4.1 Main findings

The primary objective of this study was to determine whether it was possible to develop a list of words that are highly related to internal states (e.g. cognitive/physiological) and not confounded by emotional content. To this end, a word list was compiled of internal and neutral words matched for word length and frequency of occurrence in the English language according to Thorndike and Lorge (1944) and/or Leech *et al.* (2001). In developing this word list, it is hoped that this material could be used in future research exploring cognitive biases in bipolar disorder, particularly to investigate potential hypotheses derived from Mansell *et al.* (2007) integrative cognitive model.

The secondary objectives were to further validate the word list and carry out a preliminary investigation testing hypotheses related to self-relevant appraisal of internal states derived from Mansell *et al.* (2007) model. It was hypothesised that

there would be a relationship between participants' scores on measures of mania and/or depression and ratings of self-relevance of internal, but not neutral, words.

4.1.1 Is it possible to identify a list of words that are highly internal but not confounded by emotional content?

In order to answer this question, participants were asked to rate a list of internal words and matched neutral words on a 7-point likert-type scale for level relating to internal and emotional state. The findings from frequency analysis supported this prediction. A list of 10 internal state words were identified as meeting criteria for being highly related to an internal state and low in emotional state (≥ 6 and ≤ 4 respectively on modal response). Matched neutral words also met criteria for low ratings on internal and emotional states (≤ 4 on both ratings). This led to identification of 10 internal and neutral words matched for word length and frequency of use in English language. These words are presented as possible material to use in future research, investigating information processing bias to internal state stimuli (controlled for emotion content). Furthermore, on the whole, participants rated internal state words as significantly more relevant to themselves than neutral words, supporting the operationalisation of these words.

4.1.2 Is it possible to identify a list of words that are highly related to internal and emotional states?

Although not a main objective of this study, an attempt was made to explore the possibility of identifying a list of highly internal and highly emotional words for possible use in future research considering information processing bias to emotion

and internal state related stimuli. The findings from frequency analysis supported this prediction. A further list of 14 internal-emotional words were identified as meeting criteria for being highly related to an internal and emotional state (≥ 6 modal response on the internal scale and ≥ 5 modal response on the emotional scale) and matched with a set of neutral words meeting criteria for being low in ratings of internal and emotional sates (≤4 on both). Again, participants rated internal-emotional words as significantly more relevant to themselves than neutral words, also supporting the operationalisation of these words.

4.1.3 Do measures of self-relevance of internal words correlate with measures of mania and depression?

A secondary objective of this study was to carry out a pilot investigation of the validity of the generated word list. A number of hypotheses derived from Mansell *et al.* (2007) model were tested (see pp 106-107 for hypotheses). If such hypotheses were found to be true, then this would provide some validity for the internal words identified in the primary analysis above. To tests the hypotheses, a series of correlations were conducted using the list of 10 internal and matched 10 neutral words.

Firstly, it was predicted that, individuals who scored high on measures of mania (ASRM and/or ISS-ACT sub-scale) would also rate internal words but not the matched neutral words as highly self-relevant or meaningful to them.

Correlational analysis from the sample as a whole demonstrated a moderate positive correlation between self-relevance ratings of internal words and individuals' mean scores on the two measures of mania (ISS-ACT and/or ASRM). Those who scored highly on measures of mania also rated internal words as highly self-relevant. Although this finding supports the hypothesis relating to self-relevance of internal words, findings of a similar relationship between scores on measures of mania and self-relevance rating of neutral words were not as expected. As individuals' scores on the ASRM and the ISS-ACT increased so did their ratings of self-relevance for both internal and neutral words.

Secondly, it was predicted that individuals who scored high on measures of depression (HADS-D and/or ISS-Depression) would also rate internal words but not the matched neutral words as highly self-relevant or meaningful to them. Results from the correlational analysis provided some support for this hypothesis. Those individuals scoring higher on the HADS-D also rated internal words as highly self-relevant. However, similar relationships were observed between self-relevance ratings of internal and neutral words and measures of depression. Nevertheless, this was only found on the HADS-D. The findings from the ISS-DI did not support any of these predictions, revealing non-significant results for both neutral and internal words.

4.2 Other findings

Other results identified significant positive relationship between both self-relevance ratings on neutral and internal words and individuals' scores on the HADS-A

(anxiety). Although measuring anxiety was not specific to this study, one may hypothesise that participants scoring high on the HADS-D may also score high on HADS-A given the high co-morbidity between the two disorders. Hence a similar positive correlation as predicted with self-relevance ratings and the HADS-D may be observed with the HADS-A. One could further postulate that participants with anxiety symptoms may also rate internal words as more self-relevant than neutral words, given that some of the words identified refer to physiological stimuli (e.g. palpitate) and could be seen to be meaningful to individuals experiencing anxiety. This is in line with cognitive models proposed by Clark (1999) and Wells and Mathews (1994) with regards to interpretation and appraisal of intrusions (such as body state information) in meaningful and maladaptive ways. However, as with the previous finding on the HADS-D, similar positive correlations were observed between scores on measure of anxiety and self-relevance ratings for both word types.

Further analysis of the 14 internal-emotional and matched neutral words and measures of mania and depression also revealed confusing results. As no specific hypotheses were made regarding these words, the analysis was not used to test specific hypotheses but as an exploratory investigation.

With regards to a relationship between self-relevance ratings on internal-emotional words and measures of mania, a moderate effect was found in a positive direction, similar to that found on internal only words. A similar relationship was also found between self-relevance ratings of these words and scores on the HADS-D but not the ISS-DI. This is interesting, as although no specific hypotheses were made, it could be

expected that in line with previous findings of mood congruence, particularly with depressive symptoms, a stronger relationship would be found with self-relevance ratings of these words and depressive measures compared to that for internal only words, although, other research has found mood congruence in mania relating to negative stimuli but not positive stimuli). The findings suggest that even when words are confounded by emotional content, participants still rated them as highly relevant.

4.3 Possible explanations for the main findings

The ability to generate a list of internal only words is promising and provides valuable material to be used in future investigations of cognitive styles in individuals with bipolar disorder testing hypotheses related to internal states. Unfortunately, the findings from the correlational analysis do not provide clear support for the predicted hypotheses or for the internal state word list. It is also difficult to explain such findings in relation to previous research given that this study (as far as the researcher is aware) has not been conducted previously. However, a number of possible factors have been considered as potentially influencing the study's findings. One possible explanation relates to the use of a student sample to investigate hypotheses derived from a model relating to a clinical population.

It was predicted that there would be a significant relationship between participants' scores on measures of mania and depression and self-relevance ratings of internal but not neutral words. This prediction was derived from Mansell *et al.* (2007) cognitive integrative model and previous research relating to information processing bias in mood disorders. The model suggests that individuals vulnerable to developing

bipolar disorder place extreme personal meaning (self-relevant) to changes in internal states (e.g. cognitive, physiological or affective). Such maladaptive cognitive styles are thought to further impact on mood, cognition and behaviour.

This thesis conceptualises bipolar disorder on a broader clinical spectrum, including softer presentations relating to for example, brief hypomania and/or temperamental features (e.g. Akiskal *et al.,* 2000; Akiskal & Malya, 1987 ; Akiskal & Pinto, 1999). It is therefore not unreasonable to predict that perhaps some of the participants used in this study, may have exhibited 'bipolar-like' characteristics and even met diagnostic or clinical criteria for bipolar disorders (although this was not assessed, nor were the participants' psychiatric history obtained).

Bipolar disorder prevalence rates, using current diagnostic classification systems (e.g. DSM-IV), are estimated to be between 0.4-1.6 per cent for bipolar I and between 1-2.5 per cent for bipolar II (Scottish Intercollegiate Guidelines Network [SIGN], 2005). Similar figures are estimated at approximately 1-1.5 per cent of the population (Goodwin & Jamison, 2007). In applying these figures to this study's sample, it might be expected that two participants (at most) might meet full diagnostic criteria for bipolar I or II. If the figures are extended to account for a broader bipolar spectrum, the rates rise to approximately 3-6 per cent of the population or if combined with full blown mania and depression 5-7 per cent (Akiskal, 1996) or even up to 8.3 percent (Goodwin & Jamison, 2007). Applying this larger prevalence rate, one could expect to find six participants (at most) meeting criteria for a broader bipolar spectrum in this study's sample.

In considering the above rates, it could be argued that this study's sample may be too small to detect a sufficient number of individuals experiencing bipolar type symptoms (even at the softer end of the spectrum) and so it is difficult to draw firm conclusions relating to self-relevance of internal material as hypothesised to be observed in a bipolar disorder population. This could also explain why participants' ratings of self-relevance were on the whole, moderately correlated with indices of mania and depression for both types of words.

In considering the clinical cut-off rates (see p. 99 & table 3.8) for measures used in this study, it can be seen that eleven participants met clinical cut-off levels for measures of mania as seen on the ASRM. On the ISS-ACT (also measuring mania/ hypomania) previous studies have shown mean scores of 218.8 (SD 137.1) in a bipolar sample (Bauer *et al.,* 2000). In this study, the mean score on this measure was 113.86 (SD 86.62) and twelve participants scored at the level of 218.8 or above.

With regards to measures of depression, previous studies using clinical samples have found an optimal cut-off point of 8 or above on the HADS-D (Snaith & Zigmond, 1994; Hamer *et al.*, 1991). In non-clinical samples a higher cut-off point of 11 or more is recommended to account for high rates of anxiety (Crawford *et al.,* 2001). A cut-off of 11 or above would identify 'probable' cases for depression, whereas a score of 8-10 would suggest 'possible' cases for depression (Snaith & Zigmond, 1994). In this study twelve participants scored at a level of 8 or above on the HADS-D, showing possible depression. However, when employing Crawford's

recommendation of 11 or above, none of the participants' scores reached clinical rates. With regards to the ISS, Bauer *et al.* (2000) reported mean scores of those classified as depressed in his sample as 78.0 (SD 29.1) on the depression index. In this study, ten participants scored at the same level or above.

Reflecting on the above findings, it could be argued that significant results were not obtained in the predicted direction to support the hypotheses relating to self-relevance of internal only stimuli, due to the limited number of participants meeting clinical levels of mania and depression. However, participants' responses in this study did reflect a response bias, in that as their ratings for self-relevance increased (regardless of word type) so did their ratings on measures of mania and depression. This could be explained by a general response bias to extreme ratings, regardless of the stimuli being measured. For example, similar findings are found in participants scoring high on measures of neuroticism. As scores on measures of neuroticism increase so do ratings on all other measures (therefore seeing all stimuli as self-relevant) (see Gillanders & Fleming, 2006). It could also be argued, that in line with other studies, the degree of responding to material as self-relevant appears to increase as scores on measures of depression (and anxiety)/ and or mania increase (perhaps reflecting increases in neuroticism), in particular when the material is ambiguous. As described, increased levels of trait neuroticism have been found in individuals with bipolar disorder compared to healthy controls and hence it is possible that elevated scores on such measures may also be associated with increased levels of neuroticism. Also, in a study considering the role of self-referential processing in a sample of undergraduate students distinguished by high and low dysphoria, Smallwood (2007)

reports over-generalised style of self-referent information processing. Self-referent bias was found to be independent of emotional tone, especially as ambiguity of material increased, therefore suggesting that dysphoria is associated with an over-general sense of self. It is possible that findings in this study reflect a similar processing style, particularly if participants found the material to be ambiguous. It would be expected that a bipolar disorder sample would rate internal state words as more relevant to them than neutral words, although this over-general sense of self may also be evident in this group, as it has been shown in unipolar depressed samples (but in relation to emotionally toned stimuli).

Clearly this study requires replication on a clinical sample (bipolar spectrum disorder). Nevertheless, the main objective was to develop material to use in future investigations of cognitive styles relating to internal vs. neutral stimuli in bipolar disorder. It was therefore reasonable to use a student sample as done in various other studies developing similar material (e.g. Derry & Kuiper, 1981; Gotlib *et al.,* 2005; Henderson *et al.*, 2007). The preliminary investigation of self-relevance of internal vs. neutral stimuli was a secondary objective. Nonetheless, this was necessary to allow for further validation of the internal and neutral word list and to tentatively explore the hypotheses relating to self-relevance of internal stimuli derived from Mansell *et al.* (2007) model. The use of a student sample was therefore deemed appropriate for this purpose and supported by the possibility of this sample displaying 'bipolar-like' characteristics and previous studies using student samples to test predictions relating to cognitive styles in bipolar disorder (with equally small

samples) and testing self-referent processing of emotionally toned material in dysphoric samples (e.g. Smallwood, 2007).

The findings may be further explained by consideration of the measures used in this study. Perhaps the measures were not sensitive enough to identify symptoms of mania and/or depression in this non-clinical sample. As far as the author is aware, the ASRM has not been used on non-clinical samples and hence it is not clear whether this measure is sensitive to identifying manic symptoms in a student sample. However, subscales of the ISS (as used in the current study) have been shown to correlate well with other measures of mood, such as, the mood disorder questionnaire (MDQ; Hirchfeld *et al.*, 2000) and the Hypomanic Personality Scale (Eckblade & Chapman, 1986) in a student sample, and show a high degree of cross-validation between these measures in identifying bipolar spectrum disorders (Udachina & Mansell, 2007). The HADS- Depression scale, has also been shown to be a relatively accurate indicator of depressive symptoms in students, although the recommended cut-off would be higher than that in a clinical sample (Andrews *et al.*, 2006).

No information was gathered regarding the participants' current or past psychiatric history, however, one may postulate that they were a relatively healthy group. Perhaps it was unlikely that such a sample would score highly on measures of mania. It could be argued that participants may be concerned with reporting such symptoms because of stigma. It may be more likely that they would report softer presentations such as hypomania if using a hypomanic scale. Using more implicit measures to assess self-relevance of internal vs. neutral stimuli may have revealed different

results, however, such implicit tasks usually require participants to complete a range of tasks in a laboratory setting and the design of this study did not permit this. Additionally, the emphasis was on simplicity and reduction of response burden. Using self-report measures allowed better access to a bigger sample without direct contact. Future studies may wish to replicate these findings using a more specific measure of hypomania (e.g. Hypomanic Personality Scale as used by Bentall & Thompson, 1990), which considers the softer presentations of bipolar spectrum disorders and perhaps asses self-referent processing of internal vs. neutral material using more implicit tasks, such as those used in previous studies (e.g. Lyon *et al.,* 1999; Reilly-Harrington *et al.*, 1999).

It is also possible that using a likert-type scale to measure self-relevance ratings was restrictive and at risk of subjective interpretations and biased responses. In an attempt to avoid this, clear instructions (as used in Pavio *et al.,* 1968) and definitions of the construct being investigated were provided. To account for subjective bias, it may be useful to employ more implicit measures.

Finally, the type of words selected for both neutral and internal differed in lexical context, with internal words predominantly forming adjectives and neutral words more inclined to nouns. It could be argued that nouns are easier to imagine (see Pavio *et al.,* 1968), which could influence ratings. Future studies may want to control for imaginability of words or attempt to identify neutral words, also matched for imaginability. Again, replicating this study with a clinical sample is likely to clarify these results.

Given that this study is an initial step towards developing material to explore specific hypotheses in relation to an integrative model proposed by Mansell *et al.* (2007), it is difficult to draw any broader theoretical or clinical implications from the findings alone or to relate them to prior research, of which there is little/ none. Hence, only tentative suggestions are made in the next section with regards to future work and possible clinical and theoretical implications.

4.4 Clinical and theoretical implications

By developing a list of internal words not confounded by emotion, it may be possible to use such material to investigate the hypothesis that individuals with bipolar disorder present information bias to internal state stimuli. Research has shown negative bias to mood-congruent information and bias to threat information in both unipolar, anxiety, psychosis and more recently, bipolar individuals, using experimental measures adapted from cognitive science to assess processing styles (e.g. using word lists in recall and reaction time tasks). The findings relating to bipolar disorder seem to support similar cognitive biases to depressive type information as that found in unipolar, suggesting a similar cognitive bias may exist. As described in stress-vulnerability models such as Beck's (1967, 1976), cognitive vulnerabilities coupled with stressful life events could lead to the onset, or increase in, symptomotology, particularly in relation to depression. In addition, findings of attentional bias to anxiety information (e.g. MacLeod *et al.,* 1986) provide support for cognitive models used to understand anxiety disorders such as Clark's (1999) model of panic. These findings, amongst others, provide support for the use of

psychological interventions such as cognitive behavioural therapy for treatment of psychiatric disorders. Because cognitive styles and vulnerability research is still in its infancy for bipolar disorder, further research would help to further support cognitive theories, identify particular cognitive styles and establish how psychological therapies (such as cognitive therapy) may help in the treatment of bipolar disorder. Finding information-processing biases in bipolar disorder may help to tailor psychological interventions (e.g. mindfulness based strategies, attentional control), to target maladaptive cognitive styles such as self-focused attention, appraisal and hypervigilance to external or internal stimuli. At the very least, raising awareness of the vulnerability to such cognitive styles in individuals with bipolar disorder is important to normalise and increase perceived control of difficulties.

If similar findings are found in information processing bias to internal states, it could be argued that individuals with bipolar disorder not only show a cognitive vulnerability or information processing bias to mood congruent information, but also to internal state stimuli (separate to emotional stimuli). Similar clinical implications would apply, especially in helping patients rationalise (not to catastorphise) changes to internal states.

As a clinical sample was not used in this study and given that few participants showed clinically significant scores on measures of mania and/or depression, it is difficult to generalise the findings to a clinical sample. This study would need to be replicated with a clinical sample to determine whether similar findings regarding self-relevance of internal and neutral information is apparent.

The implication of appraising information in a meaningful way would have potential consequences on an individual's behaviour and possible course of the disorder (Mansell *et al.*, 2007). Adapting behaviour in a particular manner due to a negative or positive appraisal could also lead to further disruption of biological process (e.g. circadian rhythm) and further exacerbation of symptoms, potentially escalating to relapse or full-blown episode.

Because no other studies have considered appraisal of internal states in a non-clinical or clinical sample in relation to bipolar disorder, it is difficult to establish whether the tendency to consider all information as self-relevant is a particular style associated with this sample or a chance finding. This is discussed earlier under 'possible explanations for the main findings'.

4.5 Future research

The main purpose of this study was to develop material to test particular hypotheses drawn from Mansell *et al.* (2007) integrative cognitive model for affective disorders (see pp. 62-65).

On the basis of Mansell *et al.* (2007) model, it was predicted that if individuals with bipolar disorder were likely to notice internal state changes as intrusions into awareness, and appraise such changes in a meaningful manner (either positively or negatively), then potentially they would also show a bias in processing information

related to internal states as opposed to neutral stimuli, similar to findings in anxiety disorders (e.g. hypervigilance to physiological states).

Information processing biases have been shown in relation to emotionally laden stimuli in depression and more recently in bipolar disorder, using cognitive tasks such as attention and recall (memory) tasks to test such hypotheses. Word lists of various types, but mainly relating to mood related information, have been utilised as the stimulus within these experiments e.g. Bentall and Thomson's study (1999) and Jongen *et al.* (2007) using different cognitive tasks to assess such biases (e.g. Emotional Stroop or Dot-Probe). It was hypothesised that by using similar experimental procedures and comparing performance of bipolar individuals to healthy controls (matched for age, gender, intellectual ability), one would be able to test hypotheses relating to attentional bias to internal state stimuli, potentially supporting Mansell *et al.* (2007) model and providing further insight into the cognitive style and vulnerability of individuals with bipolar disorder.

Future research may want to use the list of internal and neutral words generated in this study in cognitive tasks, which measure information processing to test the above predictions in a sample of bipolar disorder and healthy controls. Comparisons could also be made with respect to investigating such cognitive styles in different mood states, and/ or over time, in order to distinguish state and trait specific vulnerabilities. It would also be interesting to compare the performance on such measures between individuals with bipolar disorder and other psychiatric disorders (e.g. unipolar

depression, anxiety and psychosis), to illustrate similarities and differences among different disorders and consider theoretical and clinical implications.

Findings from the correlational analysis investigating the relationship between self-relevance ratings of internal and neutral stimuli and measures of mania and depression, suggests that self-relevance ratings for both stimuli moderately correlated with indices of depression and mania. It would be interesting to replicate these findings with a clinical sample and compared to a more representative sample of healthy controls (e.g. general population instead of students).

Finally, the recent interest in investigating coping styles (including cognitive coping such as rumination) may add an interesting angle to perceived coping of changes to internal sates (intrusions to awareness). One may want to explore the relative value of such an investigation using measures assessing perceived control, as developed by Pallant (2000).

4.6 Strengths, limitations and suggestions for improvement

It is important to highlight that, as far as the author is aware, this is the first study of its kind to develop a set of material to test specific hypotheses related to internal states in bipolar disorder. It is therefore expected that although an attempt was made to control for factors influencing the study's findings, in what is feasible for its purpose, future studies may want to replicate the design or improve on particular aspects, as suggested above.

Some of the limitations of the study have been highlighted earlier. It could be considered that the sample was biased and some of the results (e.g. self-relevance) would therefore not be generalisable to a clinical sample. However, previous studies have employed student samples in exploring cognitive styles (e.g. Clark & Teasdale, 1985; McCabe, 1999) to explore hypotheses based on cognitive vulnerabilities for psychological disorders (e.g. anxiety/ depression). More specifically, Bentall and Thompson (1990) used a student population in their study looking at information biases and cognitive styles in hypomanic individuals. It seems acceptable to employ similar methods (e.g. student sample) in this current study as a preliminary investigation of self-relevance of internal state stimuli. Additionally, the sample size was adequate to detect moderate sized correlations, hence it would be expected that one might find a good spread of scores (variation) amongst the sample.

With regards to using students to identify the list of internal non emotional words matched with neutral words, the method applied is regarded as appropriate and perhaps an improvement on previous studies that have developed word list material for investigating information processing bias as cognitive vulnerability. For example Lyon *et al.* (1999) developed a word list of positive and negative words for use in an adapted emotional Stroop task, selecting 180 words (positive and negative) and testing them with only 14 normal participants, rating on 10-point scale, for emotionality and pleasantness. It could be argued that a 10-point scale may obtain diminishing results (Robson, 1993). Similarly, student samples have been used to rate words for emotional content and specificity (Gotlib *et al.*, 2005), and to rate a pool of words for content and imagery (Derry & Kuiper, 1981).

It could be argued that the criteria for selecting the words relating to internal and emotional states in this study were not sufficient to identify truly internal, non-emotional words and therefore influenced the results of self-relevance ratings. In order to ensure that the words selected were highly internal, a criterion of a modal response of 6 or above was set. Although the mean response was selected in previous studies (e.g. Derry & Kuiper, 1981 and Gotlib *et al.,* 2005) from a possible 7-point scale, the modal response was used in this study to reflect the most common response and to account for any extreme responses in the sample, which may have biased the average response. The criteria set for words rated as high on internal state was set, as a modal response of 6 or above, which was considered as very modest. In the two previous studies mentioned, words were included if they met a criteria of 4 or more on a 7 point-scale for the particular construct they were measuring and low ratings on constructs they were controlling for (in this study, this would reflect low scores in emotional scales). The two studies have a lower criterion for inclusion of words based on the construct being controlled (<2.85 in Derry & Kuiper's study or <2 in Gotlib *et al.* study). One could argue that a lower criteria (e.g. ≤3) would have been more supportive of excluding emotional content of the internal words. However, given that this study is the first of its kind to attempt to create such a word list, these considerations may be applied in future studies. Lastly, in exploring the raw data for student's ratings of emotionality for the internal only words, emotional ratings were mainly 3 or below, with only two of the words being rated at a modal response of 4 on the emotional scale, with half of the words being rated as 2 (modal rating) or below. Reducing criteria (modal response) for selection of internal words on the

internal scale would allow inclusion of more words, however this was set high to ensure that the selected words were highly internal. It may be suggested that internal words are difficult to separate from emotional content, given that emotions are also internal states. Future studies should consider controlling for emotional content further (as attempted in this study)

4.7 Conclusion

Psychological research in the field of bipolar disorder is relatively new. Some important insights are emerging on the role of psychological factors in the development, onset, course and recurrence of bipolar disorder. Cognitive theories are rapidly evolving alongside a clear emphasis on the integration of various models.

The exploration of cognitive styles in bipolar disorder has been mainly influenced and adapted from research in the field of unipolar depression, arguably too loosely and with mixed results. The work of Mansell *et al.* (2007) has begun to draw on implications of cognitive styles in other disorders such as anxiety and psychosis, allowing parallels and insights from different psychiatric disorders to be explored.

This study aimed to develop material for use in future cognitive science research in bipolar disorder with a view to providing insights into the cognitive vulnerabilities and styles expressed in the disorder, adding to the literature base in this area and examining the clinical and theoretical implications.

It is clear that research in this field faces multiple methodological difficulties. However, it is essential that such research continues to further understand the disorder and all of its complexity, given its prevalence and significant impact on the individual, their family and society at large. Effective interventions and early identification (including identifying risk factors) are clearly necessary, especially given the limited benefits obtained from pharmacological interventions in some individuals.

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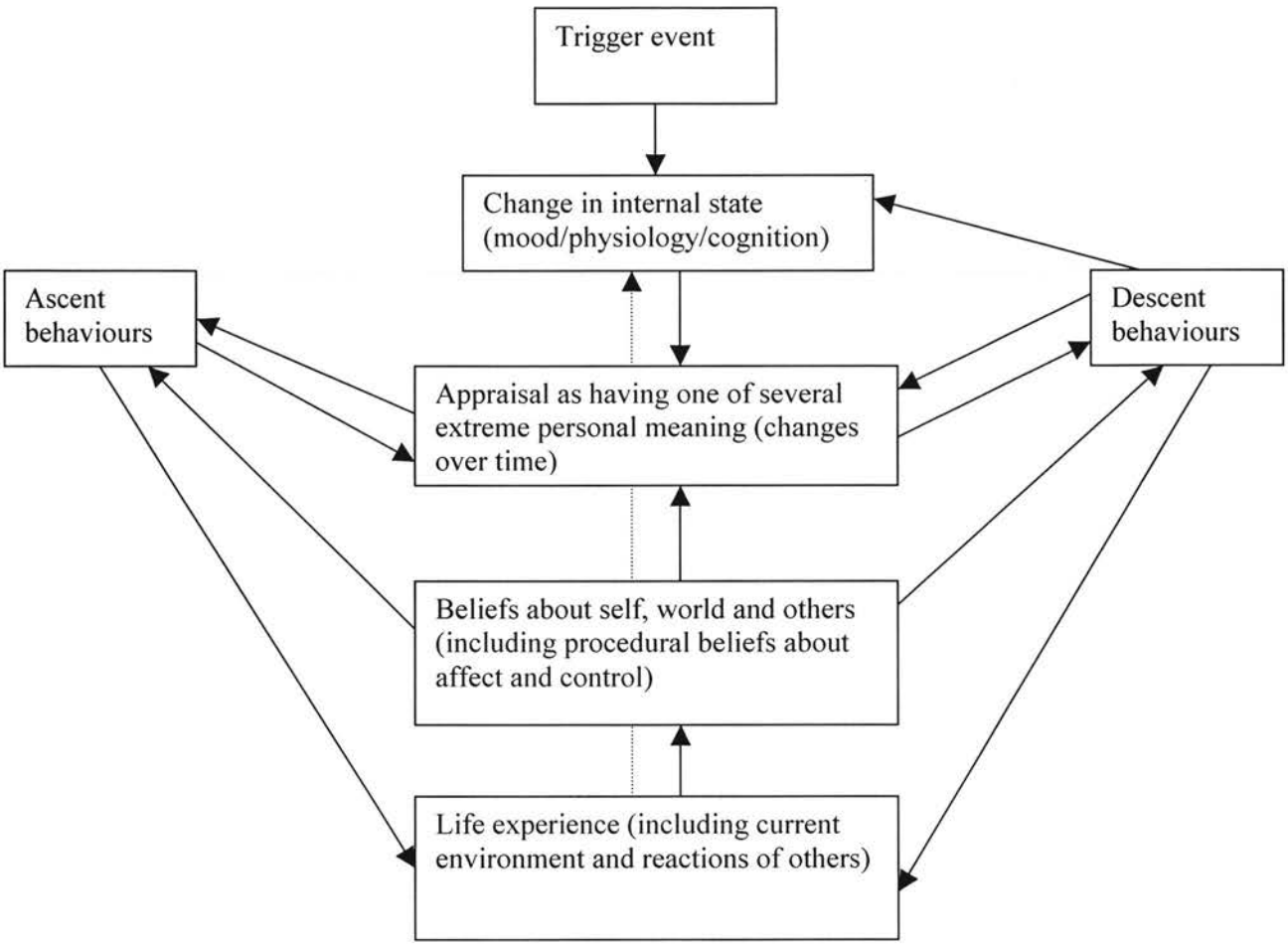
APPENDICES

APPENDIX 1

A cognitive model of mood swings and bipolar disorders

A Cognitive model of mood swings and bipolar disorders



Taken from: Mansell *et al.* (2007) The interpretation of, and responses to, changes in Internal States: An Integrative Cognitive Model of Mood Swings and Bipolar Disorders. *Behavioural & Cognitive Psychotherapy, 35,* 515-539.

APPENDIX 2

Lanarkshire NHS Research Ethics Committee (Certificate of approval)

Lanarkshire Local Research Ethics Committee

LIST OF SITES WITH A FAVOURABLE ETHICAL OPINION

For all studies requiring site-specific assessment, this form is issued by the main REC to the Chief Investigator and sponsor with the favourable opinion letter and following subsequent notifications from site assessors. For issue 2 onwards, all sites with a favourable opinion are listed, adding the new sites approved.

REC reference number:	07/S1001/110	**Issue number:**	0	**Date of issue:**	20 March 2008
Chief Investigator:	Miss Suzanne Aziz				
Full title of study:	Memory and Attention Bias in Bipolar Disorder				

This study was given a favourable ethical opinion by Lanarkshire Local Research Ethics Committee on 20 March 2008. The favourable opinion is extended to each of the sites listed below. The research may commence at each NHS site when management approval from the relevant NHS care organisation has been confirmed.

Principal Investigator	*Post*	*Research site*	*Site assessor*	*Date of favourable opinion for this site*	*Notes* [1]
Miss Suzanne Aziz	Trainee Clinical Psychologist	Lanarkshire NHS	Lanarkshire Local Research Ethics Committee	20/03/2008	

Approved by the Chair on behalf of the REC:

... (Signature of Chair/Co-ordinator)

(delete as applicable)

..... (Name)

(1) *The notes column may be used by the main REC to record the early closure or withdrawal of a site (where notified by the Chief Investigator or sponsor), the suspension of termination of the favourable opinion for an individual site, or any other relevant development. The date should be recorded.*

APPENDIX 3

Lanarkshire NHS Research & Development Department
(Condition of management approval)

Lanarkshire Primary Care NHS Trust

Miss Suzanne Aziz
Trainee Clinical Psychologist
NHS Lanarkshire, Clinical and Counselling Psychology Services
Strathmore House, Room 29, Level 2
Brouster Gate
East Kilbride
G74 1LF

NHS Lanarkshire

Research & Development Office,
Strathclyde Hospital,
Airbles Road,
Motherwell,
ML1 3BW.

28th March 2008
Phone/FAX 01698 245196/245091

Ref LAPPr821
Ethics 07/S1001/110

Dear Miss Aziz,

Conditions of Management Approval to undertake the project:
" Memory and Attention Bias in Bipolar Disorder "

I am pleased to inform you that you have management approval to undertake the above study in NHS Lanarkshire (Primary Care Division). As the Chief Investigator for the study you are subject to the following requirements:

1 You have approval to undertake research activities relating to non-commercial NHS Research & Development under the terms of Scottish Executive Research Governance Framework for Health and Community Care ("Approved Research Projects"). (see CSO website: www.show.scot.nhs.uk/cso) Local Research Governance monitoring may involve audit of your research at some time in the future.

2 Your study can only commence once a favourable ethics opinion has been given and any amendments made to an ethics committee should also be notified to the Research & Development Office.

4 Within NHS Lanarkshire you are responsible to Mr Padhraic Dolan and are required to comply with Good Clinical Practice, Research Governance and Ethics Guidelines, Health & Safety Laws, Data Protection Act 1998 and all other Policies and Procedures as laid down by NHS Lanarkshire.

5 You must ensure that all confidential information is maintained in secure storage. You are further obligated under this agreement to report to the NHS Lanarkshire Data Protection Office and the Research & Development Office infringements, either by accident or otherwise, which constitutes a breach of confidentiality.

6 This agreement is in relation to the above study and will be effective from the date of this letter to 31st December 2008.

7 You must send brief annual reports followed by a detailed final report and summary to the R&D office in hard copy and electronic formats.

Best wishes with your project.

Yours sincerely,

Dr J. M. Gaukroger
Research & Development Manager

APPENDIX 4

Information sheet & demographic information

Memory and Attention Bias in Bipolar Disorder

(Suzanne Aziz, Trainee Clinical Psychologist
D.Clin.Psychol: Year 4)

General information and instructions

Purpose of the study

I am a Trainee Clinical Psychologist, studying Clinical Psychology at the University of Edinburgh. As part fulfilment of the course I am required to carry out a piece of research.

My research project aims to investigate cognitive bias in individuals diagnosed with Bipolar Disorder compared to a healthy control group. This will be investigated through administration of a memory and attention experimental task. I am also interested in investigating whether there are any differences in the appraisal of internally relevant information between the two groups.

In order to investigate the above cognitive processes, I have developed a word list, which will be used in a free recall, recognition and attention task as part of my main study. As the word list is being developed by myself (hence is not based on previous research), it requires some form of validation, this is where I am requesting your help.

How can you help?

On the first page you will be asked to provide some basic information about yourself. You will then be asked to complete the word rating task, which is described below. Finally, you will then be asked to complete three questionnaires related to mood and anxiety (your responses on the questionnaires will be used to compare against your responses on the word rating task). All of the information you provide will remain anonymous and will be stored securely. You do not have to take part in this study if you do not wish to.

Support

If your participation in this study raises any concerns that you would like to discuss in confidence you can contact me on 01355 249 470 or 07887735822 or at suzanneaziz@hotmail.com. Alternatively you can access free and confidential support via the university counseling service. Information regarding this service can be found at www.student-counselling@ed.ac.uk or you can contact them on 0131 650 4170 or via email at Student.Counselling@ed.ac.uk . There is also a nightline service which runs between 8 p.m. and 8 a.m. which is anonymous and confidential. Information for the nightline service can be found on www.ednightline.com or you can speak to a volunteer on 0131 557 4444.

Procedure for completing the word-rating task

On the next page you will find a list of words some related to internal states and some which are neutral (I will define what I mean by internal on the page related to that

particular rating). I would be grateful if you could spend some time rating the words according to the scales provided. I will be asking you to rate each word according to whether you think the word is internally related; how emotional the word is and also how relevant the word is to you. You will therefore have three ratings per word. Please read the words carefully and consider your response. Once I have enough data gathered from participants, I will be selecting the most relevant words to use in the main part of my study with the two groups mentioned above. ***It is therefore extremely important that you are honest with your answers. There are no right or wrong answers, please just rate the words according to your own gut feeling about each one.***

Your ratings will be made on a seven point scale, where **one** would indicate that you do not consider the word to be internal/emotional or relevant to you at all and **seven** would mean that you consider the word to be extremely internal/emotional or relevant to you. Make your rating by putting a circle around the number from 1 to 7 that best indicates your agreement. The words that you consider least likely to be related to an internal state should be given a rating of 1; words that you consider most likely to be related to an internal state, should be rated as 7; Feel free to use the entire range of numbers, from 1 to 7; at the same time, don't be concerned about how often you use a particular number as long as it is your true judgement. Work fairly quickly but do not be careless in your ratings.

If necessary, refer back to these instructions when rating the words on the following pages.

Demographic Information

Please take a few minutes to complete the following information before proceeding with the task. This information will be used as a means of tracking participant responses and for reporting the age range and male/ female ratio in the study and not for any other purposes. ***By completing this form, you are giving consent for your responses to be used in this particular study.***

Male/Female *(please circle)*

Age.....*(in years)*

Undergraduate course/ Postgraduate course *(please circle)*

APPENDIX 5

Internal rating scale

WORD RATINGS- 'INTERNAL'

Please rate the words below according to how much you think each word relates to an INTERNAL state.

Definition of an internal state

Internal states refer to inner body- physiological, feelings or cognitive domains. Change of internal state may occur as a response to an event e.g. being invited to a party may prompt a reaction of excitement (feeling). Or having several cups of coffee may prompt increase in arousal, which may lead to an increase in heart rate (physiological). Driving a car requires a certain level of concentration (internal cognitive process).

	Not at all Internal						Extremely Internal
1. Molecule	1	2	3	4	5	6	7
2. Impulsive	1	2	3	4	5	6	7
3. Index	1	2	3	4	5	6	7
4. High	1	2	3	4	5	6	7
5. Seat	1	2	3	4	5	6	7
6. Illuminate	1	2	3	4	5	6	7
7. Confused	1	2	3	4	5	6	7
8. Forgetful	1	2	3	4	5	6	7
9. Rational	1	2	3	4	5	6	7
10. Measure	1	2	3	4	5	6	7
11. Inspired	1	2	3	4	5	6	7
12. Suspicious	1	2	3	4	5	6	7
13. Crisp	1	2	3	4	5	6	7
14. Television	1	2	3	4	5	6	7
15. Watershed	1	2	3	4	5	6	7
16. Fridge	1	2	3	4	5	6	7
17. Curry	1	2	3	4	5	6	7
18. Drowsy	1	2	3	4	5	6	7
19. Reservoir	1	2	3	4	5	6	7
20. Detached	1	2	3	4	5	6	7

	Not at all Internal						Extremely Internal
21. Aware	1	2	3	4	5	6	7
22. Vigilant	1	2	3	4	5	6	7
23. Blindfold	1	2	3	4	5	6	7
24. Flushed	1	2	3	4	5	6	7
25. Hunger	1	2	3	4	5	6	7
26. Crave	1	2	3	4	5	6	7
27. Gold	1	2	3	4	5	6	7
28. Energetic	1	2	3	4	5	6	7
29. Focused	1	2	3	4	5	6	7
30. Tired	1	2	3	4	5	6	7
31. Spoon	1	2	3	4	5	6	7
32. Boathouse	1	2	3	4	5	6	7
33. Alert	1	2	3	4	5	6	7
34. Uncertain	1	2	3	4	5	6	7
35. Incoherent	1	2	3	4	5	6	7
36. Talkative	1	2	3	4	5	6	7
37. Palpitate	1	2	3	4	5	6	7
38. North	1	2	3	4	5	6	7
39. Stimulus	1	2	3	4	5	6	7
40. Waitress	1	2	3	4	5	6	7
41. Optimistic	1	2	3	4	5	6	7
42. Tense	1	2	3	4	5	6	7
43. Hasty	1	2	3	4	5	6	7
44. Slowed	1	2	3	4	5	6	7
45. Hunt	1	2	3	4	5	6	7
46. Breed	1	2	3	4	5	6	7
47. Curtains	1	2	3	4	5	6	7
48. Hummingbird	1	2	3	4	5	6	7
49. Cycle	1	2	3	4	5	6	7
50. Suburbs	1	2	3	4	5	6	7

	Not at all Internal						Extremely Internal
51. Pessimistic	1	2	3	4	5	6	7
52. Urge	1	2	3	4	5	6	7
53. Thought	1	2	3	4	5	6	7
54. Radiator	1	2	3	4	5	6	7
55. Manuscript	1	2	3	4	5	6	7
56. Superior	1	2	3	4	5	6	7
57. Monkey	1	2	3	4	5	6	7
58. Sweat	1	2	3	4	5	6	7
59. Pain	1	2	3	4	5	6	7
60. Tombstone	1	2	3	4	5	6	7
61. Breathless	1	2	3	4	5	6	7
62. Ledge	1	2	3	4	5	6	7
63. Flashlight	1	2	3	4	5	6	7
64. Indicator	1	2	3	4	5	6	7
65. Shaky	1	2	3	4	5	6	7
66. Indecisive	1	2	3	4	5	6	7
67. Auctioneer	1	2	3	4	5	6	7
68. Precious	1	2	3	4	5	6	7
69. Diary	1	2	3	4	5	6	7
70. Flavour	1	2	3	4	5	6	7
71. Cavity	1	2	3	4	5	6	7
72. Heart	1	2	3	4	5	6	7

APPENDIX 6

Emotional rating scale

WORD RATINGS- 'EMOTIONAL'

Please rate the words below according to how much you think each word relates to an EMOTIONAL state.

Definition of an emotional state

An emotion may be defined as a state of consciousness having to do with the arousal of feelings, distinguished from other mental states, as cognition, volition, and awareness of physical sensation. Any specific feeling; any of various complex reactions with both mental and physical manifestations, as love, hate, fear, anger, sad etc.

	Not at all emotional						Extremely emotional
1. Blindfold	1	2	3	4	5	6	7
2. Radiator	1	2	3	4	5	6	7
3. Slowed	1	2	3	4	5	6	7
4. Detached	1	2	3	4	5	6	7
5. Breathless	1	2	3	4	5	6	7
6. Thought	1	2	3	4	5	6	7
7. Confused	1	2	3	4	5	6	7
8. Curtains	1	2	3	4	5	6	7
9. Pessimistic	1	2	3	4	5	6	7
10. Molecule	1	2	3	4	5	6	7
11. Spoon	1	2	3	4	5	6	7
12. Flashlight	1	2	3	4	5	6	7
13. Curry	1	2	3	4	5	6	7
14. Impulsive	1	2	3	4	5	6	7
15. Tense	1	2	3	4	5	6	7
16. High	1	2	3	4	5	6	7
17. Hunt	1	2	3	4	5	6	7
18. Aware	1	2	3	4	5	6	7
19. Seat	1	2	3	4	5	6	7
20. Measure	1	2	3	4	5	6	7

	Not at all emotional						Extremely emotional
21. Watershed	1	2	3	4	5	6	7
22. Manuscript	1	2	3	4	5	6	7
23. Optimistic	1	2	3	4	5	6	7
24. Reservoir	1	2	3	4	5	6	7
25. Crave	1	2	3	4	5	6	7
26. Incoherent	1	2	3	4	5	6	7
27. Heart	1	2	3	4	5	6	7
28. Boathouse	1	2	3	4	5	6	7
29. Fridge	1	2	3	4	5	6	7
30. Hunger	1	2	3	4	5	6	7
31. Cavity	1	2	3	4	5	6	7
32. Illuminate	1	2	3	4	5	6	7
33. Focused	1	2	3	4	5	6	7
34. Drowsy	1	2	3	4	5	6	7
35. Uncertain	1	2	3	4	5	6	7
36. Sweat	1	2	3	4	5	6	7
37. Diary	1	2	3	4	5	6	7
38. Palpitate	1	2	3	4	5	6	7
39. Flavour	1	2	3	4	5	6	7
40. Inspired	1	2	3	4	5	6	7
41. Precious	1	2	3	4	5	6	7
42. Indicator	1	2	3	4	5	6	7
43. Tired	1	2	3	4	5	6	7
44. Stimulus	1	2	3	4	5	6	7
45. Auctioneer	1	2	3	4	5	6	7
46. Crisp	1	2	3	4	5	6	7
47. Vigilant	1	2	3	4	5	6	7
48. Breed	1	2	3	4	5	6	7
49. Superior	1	2	3	4	5	6	7
50. Talkative	1	2	3	4	5	6	7
51. Flushed	1	2	3	4	5	6	7

	Not at all emotional						Extremely emotional
52. Waitress	1	2	3	4	5	6	7
53. Monkey	1	2	3	4	5	6	7
54. Suburbs	1	2	3	4	5	6	7
55. Urge	1	2	3	4	5	6	7
56. Shaky	1	2	3	4	5	6	7
57. Television	1	2	3	4	5	6	7
58. Energetic	1	2	3	4	5	6	7
59. Ledge	1	2	3	4	5	6	7
60. Index	1	2	3	4	5	6	7
61. Hasty	1	2	3	4	5	6	7
62. Gold	1	2	3	4	5	6	7
63. Tombstone	1	2	3	4	5	6	7
64. Alert	1	2	3	4	5	6	7
65. North	1	2	3	4	5	6	7
66. Rational	1	2	3	4	5	6	7
67. Hummingbird	1	2	3	4	5	6	7
68. Pain	1	2	3	4	5	6	7
69. Cycle	1	2	3	4	5	6	7
70. Forgetful	1	2	3	4	5	6	7
71. Suspicious	1	2	3	4	5	6	7
72. Indecisive	1	2	3	4	5	6	7

APPENDIX 7

Self-relevance rating scale

WORD RATINGS- 'RELEVANCE'

Below is a list of words. Please rate each word according to how much you consider the word to be *relevant or meaningful to you, using the scale below.

Relevant/ meaningful suggests that you are able to associate with this word in some way, that it holds some kind of relevance to you in your current life.

	Not at all relevant/ meaningful to me						Extremely relevant/ meaningful to me
1. Indicator	1	2	3	4	5	6	7
2. Watershed	1	2	3	4	5	6	7
3. Rational	1	2	3	4	5	6	7
4. Suburbs	1	2	3	4	5	6	7
5. High	1	2	3	4	5	6	7
6. Energetic	1	2	3	4	5	6	7
7. Measure	1	2	3	4	5	6	7
8. Pessimistic	1	2	3	4	5	6	7
9. Blindfold	1	2	3	4	5	6	7
10. Spoon	1	2	3	4	5	6	7
11. Molecule	1	2	3	4	5	6	7
12. Hunger	1	2	3	4	5	6	7
13. Stimulus	1	2	3	4	5	6	7
14. Impulsive	1	2	3	4	5	6	7
15. Boathouse	1	2	3	4	5	6	7
16. Illuminate	1	2	3	4	5	6	7
17. Sweat	1	2	3	4	5	6	7
18. Hasty	1	2	3	4	5	6	7
19. Inspired	1	2	3	4	5	6	7
20. Ledge	1	2	3	4	5	6	7

	Not at all relevant/ meaningful to me						Extremely relevant/ meaningful to me
21. Vigilant	1	2	3	4	5	6	7
22. Cavity	1	2	3	4	5	6	7
23. Superior	1	2	3	4	5	6	7
24. Precious	1	2	3	4	5	6	7
25. Seat	1	2	3	4	5	6	7
26. Tombstone	1	2	3	4	5	6	7
27. Flavour	1	2	3	4	5	6	7
28. Slowed	1	2	3	4	5	6	7
29. Forgetful	1	2	3	4	5	6	7
30. Aware	1	2	3	4	5	6	7
31. Index	1	2	3	4	5	6	7
32. Television	1	2	3	4	5	6	7
33. Detached	1	2	3	4	5	6	7
34. Cycle	1	2	3	4	5	6	7
35. Pain	1	2	3	4	5	6	7
36. Waitress	1	2	3	4	5	6	7
37. Uncertain	1	2	3	4	5	6	7
38. Flashlight	1	2	3	4	5	6	7
39. Gold	1	2	3	4	5	6	7
40. Breathless	1	2	3	4	5	6	7
41. Palpitate	1	2	3	4	5	6	7
42. Reservoir	1	2	3	4	5	6	7
43. Confused	1	2	3	4	5	6	7
44. Hunt	1	2	3	4	5	6	7
45. Tense	1	2	3	4	5	6	7
46. Crave	1	2	3	4	5	6	7
47. Drowsy	1	2	3	4	5	6	7
48. Heart	1	2	3	4	5	6	7
49. North	1	2	3	4	5	6	7
50. Radiator	1	2	3	4	5	6	7

	Not at all relevant/ meaningful to me						Extremely relevant/ meaningful to me
51. Curtains	1	2	3	4	5	6	7
52. Breed	1	2	3	4	5	6	7
53. Auctioneer	1	2	3	4	5	6	7
54. Alert	1	2	3	4	5	6	7
55. Thought	1	2	3	4	5	6	7
56. Focused	1	2	3	4	5	6	7
57. Suspicious	1	2	3	4	5	6	7
58. Tired	1	2	3	4	5	6	7
59. Urge	1	2	3	4	5	6	7
60. Diary	1	2	3	4	5	6	7
61. Manuscript	1	2	3	4	5	6	7
62. Fridge	1	2	3	4	5	6	7
63. Flushed	1	2	3	4	5	6	7
64. Monkey	1	2	3	4	5	6	7
65. Indecisive	1	2	3	4	5	6	7
66. Shaky	1	2	3	4	5	6	7
67. Talkative	1	2	3	4	5	6	7
68. Incoherent	1	2	3	4	5	6	7
69. Hummingbird	1	2	3	4	5	6	7
70. Optimistic	1	2	3	4	5	6	7
71. Curry	1	2	3	4	5	6	7
72. Crisp	1	2	3	4	5	6	7

Now that you have completed the word rating task above, I would be grateful if you could go on and complete the three questionnaires found on the following pages. Please be honest with your answers and remember your responses will remain anonymous.

APPENDIX 8

Altman Self-Rating Scale (ASRM)

Altman Self-rating Scale for mania (ASRM)

Instructions

1. On this questionnaire are groups of five statements: read each group of statements carefully.

2. Choose the one statement in each group that best describes the way you have been feeling for the **past week.**

3. Circle the number next to the statement you picked.

4. *Please note:* The word "occasionally" when used here means once or twice; "often" means several times or more; "frequently" means most of the time.

Question 1

I do not feel happier or more cheerful than usual	0
I occasionally feel happier or more cheerful than usual	1
I often feel happier or more cheerful than usual	2
I feel happier or more cheerful than usual; most of the time	3
I feel happier or more cheerful than usual all of the time	4

Question 2

I do not feel more self-confident than usual	0
I occasionally feel more self-confident than usual	1
I often feel more self-confident than usual	2
I feel more self-confident than usual most of the time	3
I feel extremely self-confident all of the time	4

Question 3

I do not need less sleep than usual	0
I occasionally need less sleep than usual	1
I often need less sleep than usual	2
I frequently need less sleep than usual	3
I can go all day and night without any sleep and still not feel tired	4

Question 4

I do not talk more than usual	0
I occasionally talk more than usual	1
I often talk more than usual	2
I frequently talk more than usual	3
I talk constantly and cannot be interrupted	4

Question 5

I have not been more active (either socially, sexually, at work, home, or school) than usual	0
I have occasionally been more active than usual	1
I have often been more active than usual	2
I have frequently been more active than usual	3
I am constantly active or on the go all the time	4

APPENDIX 9

Hospital Anxiety & Depression Scale (HADS)

HADS

Read each item below and **underline the reply** which comes closest to how you have been feeling in the past week. Don't take too long over your replies, your immediate reaction to each item will probably be more accurate than a long, thought out response.

A	D				
		I feel tense or wound up		**I feel as if I am slowed down**	
3		Most of the time		Nearly all the time	3
2		A lot of the time		Very often	2
1		From time to time, occasionally		Sometimes	1
0		Not at all		Not at all	0
		I still enjoy the things I used to enjoy		**I get a sort of frightened feeling like 'butterflies' in the stomach**	
	0	Definitely as much		Not at all	0
	1	Not quite so much		Occasionally	1
	2	Only a little		Quite often	2
	3	Hardly at all		Very often	3
		I get a sort of frightened feeling as if something awful is about to happen		**I have lost interest in my appearance**	
				Definitely	3
3		Very definitely and quite badly		I don't take as much care as I should	2
2		Yes, but not too badly		I may not take quite as much care	1
1		A little, but it doesn't worry me		I take just as much care as ever	0
0		Not at all			
		I can laugh and see the funny side of things		**I feel restless as if I have to be on the move**	
	0	As much as I always could		Very much indeed	3
	1	Not quite so much now		Quite a lot	2
	2	Definitely not so much now		Not very much	1
	3	Not at all		Not at all	0
		Worrying thoughts go through my mind		**I look forward with enjoyment to things**	
3		A great deal of the time		As much as I ever did	0
2		A lot of the time		Rather less than I used to	1
1		Not too often		Definitely less than I used to	2
0		Very little		Hardly at all	3
		I feel cheerful		**I get sudden feelings of panic**	
	3	Never		Very often indeed	3
	2	Not often		Quite often	2
	1	Sometimes		Not very often	1
	0	Most of the time		Not at all	0
		I can sit at ease and feel relaxed		**I can enjoy a good book or radio or television program**	
0		Definitely		Often	0
1		Usually		Sometimes	1
2		Not often		Not often	2
3		Not at all		Very seldom	3

Now check that you have answered all the questions

A D

TOTAL ☐☐

ank you for your participation in this study. If you have any queries garding this study please feel free to contact me on 01355 249 470 or 887735822 or e-mail on suzanneaziz@hotmail.com

APPENDIX 10

Internal States Scale (ISS)

Internal State Scale (v.2)

For each of the following statements, please mark an "X" at the point on the line that best describes the way you have felt **over the past 24 hours**. While there may have been some changes during that time, try to give a single summary rating for each item.

Today my mood is changeable

0 _____ 100

Not at all Rarely — Very much so Much of the time

Today I feel irritable

0 _____ 100

Not at all Rarely — Very much so Much of the time

Today I feel like a capable person

0 _____ 100

Not at all Rarely — Very much so Much of the time

Today I feel like people are out to get me

0 _____ 100

Not at all Rarely — Very much so Much of the time

Today I actually feel great inside

0 _____ 100

Not at all Rarely — Very much so Much of the time

Today I feel impulsive

0 _____ 100

Not at all Rarely — Very much so Much of the time

Today I feel depressed

0 _____ 100

Not at all
Rarely

Very much so
Much of the time

Today my thoughts are going fast

0 _____ 100

Not at all
Rarely

Very much so
Much of the time

Today it seems like nothing will ever work out for me

0 _____ 100

Not at all
Rarely

Very much so
Much of the time

Today I feel overactive

0 _____ 100

Not at all
Rarely

Very much so
Much of the time

Today I feel as if the world is against me

0 _____ 100

Not at all
Rarely

Very much so
Much of the time

Today I feel "sped up" inside

0 _____ 100

Not at all
Rarely

Very much so
Much of the time

Today I feel restless

0 _____ 100

Not at all
Rarely

Very much so
Much of the time

Today I feel argumentative

0 _____ 100

Not at all
Rarely

Very much so
Much of the time

Today I feel energised

0 _____ 100

Not at all
Rarely

Very much so
Much of the time

Today I feel:

0 _____ 100

Depressed
Down

Normal

Manic
High

APPENDIX 11

Descriptive statistics for all internal state words

Descriptive statistics for all internal state words (ratings on internal and emotional scales)

Ratings on internal scale

Internal state word	N	Mean	Std.	Median	Mode
Rational	85	5.39	1.57	6.00	6
High	85	4.52	1.99	5.00	5
Energetic	86	5.42	1.41	6.00	5
Pessimistic	86	5.27	1.60	6.00	6
Hunger	85	5.28	1.56	5.00	7
Impulsive	85	5.29	1.70	6.00	7
Sweat	86	3.48	2.07	3.00	1
Hasty	86	4.42	1.63	4.00	4
Inspired	86	5.57	1.72	6.00	7
Vigilant	86	5.62	1.36	6.00	6
Superior	84	3.73	1.75	4.00	5
Slowed	86	4.30	1.69	4.50	5
Forgetful	86	5.28	1.45	5.00	6
Aware	86	5.57	1.34	6.00	6
Detached	86	5.36	1.63	6.00	6
Pain	85	5.25	1.52	5.00	7
Uncertain	85	5.36	1.55	6.00	6
Breathless	86	4.27	1.73	4.00	5
Palpitate	86	4.52	2.22	5.00	7
Confused	86	5.86	1.49	6.00	7
Tense	86	5.59	1.50	6.00	7
Crave	86	5.36	1.56	6.00	7
Drowsy	86	5.30	1.42	6.00	6
Heart	86	3.51	2.17	3.00	1
Alert	86	5.48	1.50	6.00	6
Thought	86	5.88	1.45	6.00	7
Focused	86	5.71	1.32	6.00	7
suspicious	86	5.60	1.72	6.00	7
Tired	85	5.46	1.55	6.00	7
Urge	86	5.51	1.49	6.00	7
Flushed	84	4.12	1.85	4.00	5
Indecisive	86	5.20	1.47	5.00	6
Shaky	86	4.37	1.57	5.00	5
Talkative	86	4.35	1.57	4.00	4
Incoherent	86	4.48	1.77	5.00	4
Optimistic	86	5.49	1.45	6.00	6

Ratings on emotional scale

Internal state word	N	Mean	Std.	Median	Mode
Rational	84	3.27	1.81	3.00	1
High	86	4.66	1.81	5.00	5
Energetic	86	3.86	1.60	4.00	4
Pessimistic	85	4.89	1.56	5.00	5
Hunger	86	3.05	1.75	3.00	1
Impulsive	85	4.46	1.65	5.00	5
Sweat	86	2.27	1.51	2.00	1
Hasty	85	3.16	1.67	3.00	3
Inspired	85	4.61	1.55	5.00	5
Vigilant	86	3.51	1.76	3.00	5
Superior	86	3.08	1.81	3.00	1
Slowed	86	2.59	1.45	2.00	1
Forgetful	86	2.93	1.66	3.00	1
Aware	85	3.56	1.80	4.00	4
Detached	85	4.68	1.70	5.00	5
Pain	86	4.38	1.92	4.00	6
Uncertain	85	4.28	1.65	5.00	5
Breathless	86	3.05	1.76	3.00	1
Palpitate	86	2.99	1.77	3.00	1
Confused	86	4.86	1.54	5.00	5
Tense	86	5.33	1.44	5.50	5
Crave	86	3.97	1.69	4.00	4
Drowsy	86	3.12	1.56	3.00	3
Heart	86	3.07	2.01	3.00	1
Alert	86	3.53	1.78	3.50	3
Thought	86	3.36	1.81	3.00	1
Focused	86	3.50	1.60	4.00	5
Suspicious	86	4.47	1.55	5.00	5
Tired	86	3.60	1.74	3.00	3
Urge	86	4.07	1.82	4.00	5
Flushed	86	3.57	1.70	4.00	3
Indecisive	86	4.02	1.69	4.00	5
Shaky	86	4.36	5.90	4.00	4
Talkative	86	3.26	1.74	3.00	1
Incoherent	86	2.93	1.40	3.00	2
Optimistic	86	5.00	1.50	5.00	5

(ratings on on self-relevance scale)

Ratings on self-relevance scale

Internal state word	N	Mean	Std.	Median	Mode
Rational	86	4.67	1.51	5	5
High	85	3.11	1.88	3	1
Energetic	86	4.64	1.28	5	5
Pessimistic	86	3.19	1.43	3	3
Hunger	86	3.85	1.83	4	3
Impulsive	85	3.78	1.68	4	3
Sweat	86	2.86	1.63	3	1
Hasty	86	3.06	1.60	3	3
Inspired	86	4.72	1.37	5	5
Vigilant	86	3.76	1.43	4	5
Superior	86	3.21	1.70	3	4
Slowed	85	2.31	1.36	2	1
Forgetful	85	3.41	1.70	3	3
Aware	86	4.73	1.50	5	6
Detached	86	3.07	1.73	3	1
Pain	86	3.19	1.75	3	1
Uncertain	86	3.66	1.65	4	4
Breathless	86	2.50	1.33	2	1
Palpitate	86	2.13	1.45	1	1
Confused	86	3.47	1.71	3	2
Tense	86	3.85	1.63	4	4
Crave	86	3.35	1.89	3	1
Drowsy	86	3.27	1.71	3	4
Heart	86	3.70	2.08	4	1
Alert	86	3.85	1.55	4	3
Thought	86	5.23	1.44	5	6
Focused	86	5.03	1.33	5	5
suspicious	86	3.42	1.58	3	2
Tired	86	4.47	1.69	4	4
Urge	84	3.71	1.80	4	4
Flushed	86	2.29	1.36	2	2
Indecisive	86	3.90	1.69	4	4
Shaky	86	2.77	1.78	2	1
Talkative	86	4.30	1.72	4	4
Incoherent	85	2.75	1.67	2	1
Optimistic	86	4.83	1.56	5	5

APPENDIX 12

Descriptive statistics for all neutral words

Descriptive statistics for all matched neutral words (ratings on internal & emotional scale)

Ratings on internal scale

Neutral word	N	Mean	Std.	Median	Mode
Indicator	86	1.47	1.00	1.00	1
Watershed	86	1.37	0.91	1.00	1
Suburbs	86	1.15	0.50	1.00	1
Measure	86	2.00	1.50	1.00	1
Blindfold	86	1.51	0.97	1.00	1
Spoon	86	1.16	0.65	1.00	1
Molecule	86	2.62	2.13	1.00	1
Stimulus	86	2.21	1.72	1.00	1
Boathouse	86	1.10	0.51	1.00	1
illuminate	86	2.95	1.76	3.00	1
Ledge	86	1.15	0.47	1.00	1
Cavity	86	1.62	1.22	1.00	1
Precious	86	2.42	1.78	3.00	1
Seat	85	1.13	0.37	1.00	1
Tombstone	86	1.48	1.15	1.00	1
Flavour	86	2.28	1.66	1.00	1
Index	85	1.45	0.97	1.00	1
Television	86	1.30	0.77	1.00	1
Cycle	86	1.77	1.46	1.00	1
Waitress	86	1.21	0.70	1.00	1
Flashlight	86	1.12	0.39	1.00	1
Gold	85	1.59	1.34	1.00	1
Reservoir	85	1.51	1.16	1.00	1
Hunt	86	1.66	1.11	1.00	1
North	85	1.12	0.57	1.00	1
Radiator	86	1.10	0.34	1.00	1
Curtains	86	1.13	0.68	1.00	1
Breed	86	1.97	1.71	1.00	1
Auctioneer	86	1.09	0.36	1.00	1
Diary	86	1.40	0.91	1.00	1
Manuscript	86	1.21	0.90	1.00	1
Fridge	86	1.20	0.61	1.00	1
Monkey	86	1.28	0.95	1.00	1
Hummingbird	86	1.08	0.28	1.00	1
Curry	85	1.33	0.79	1.00	1
Crisp	86	1.48	1.03	1.00	1

Ratings on emotional scale

Neutral word	N	Mean	Std.	Median	Mode
Indicator	85	1.27	0.73	1.00	1
Watershed	86	1.45	0.94	1.00	1
Suburbs	85	1.25	0.75	1.00	1
Measure	86	1.26	0.64	1.00	1
Blindfold	85	2.04	1.48	1.00	1
Spoon	85	1.12	0.52	1.00	1
Molecule	86	1.13	0.68	1.00	1
Stimulus	86	1.87	1.52	1.00	1
Boathouse	86	1.19	0.68	1.00	1
illuminate	86	2.09	1.37	2.00	1
Ledge	86	1.30	0.72	1.00	1
Cavity	86	1.47	0.94	1.00	1
Precious	86	3.19	1.91	3.00	1
Seat	86	1.21	0.81	1.00	1
Tombstone	86	1.88	1.63	1.00	1
Flavour	85	1.84	1.38	1.00	1
Index	86	1.17	0.58	1.00	1
Television	86	1.45	0.93	1.00	1
Cycle	85	1.55	1.14	1.00	1
waitress	86	1.38	1.02	1.00	1
Flashlight	86	1.22	0.64	1.00	1
Gold	86	1.40	1.04	1.00	1
Reservoir	85	1.34	0.89	1.00	1
Hunt	86	1.95	1.36	1.00	1
North	84	1.21	0.70	1.00	1
Radiator	86	1.19	0.54	1.00	1
Curtains	86	1.14	0.49	1.00	1
Breed	86	1.55	1.24	1.00	1
Auctioneer	86	1.13	0.48	1.00	1
Diary	86	1.65	1.31	1.00	1
Manuscript	86	1.33	1.00	1.00	1
Fridge	86	1.34	0.86	1.00	1
Monkey	85	1.47	1.15	1.00	1
Hummingbird	86	1.21	0.69	1.00	1
Curry	86	1.22	0.66	1.00	1
Crisp	85	1.25	0.63	1.00	1

Descriptive statistics for all matched neutral words (ratings on self-relevance scale)

Ratings on self-relevance scale

Neutral word	N	Mean	Std.	Median	Mode
Indicator	86	1.79	1.25	1	1
Watershed	86	1.60	1.14	1	1
Suburbs	86	2.55	1.75	2	1
Measure	86	2.56	1.77	2	1
Blindfold	86	1.35	0.79	1	1
Spoon	86	1.76	1.49	1	1
Molecule	86	1.80	1.56	1	1
Stimulus	86	2.93	1.90	3	1
Boathouse	86	1.41	1.08	1	1
illuminate	86	2.55	1.58	2	1
Ledge	86	1.41	1.06	1	1
Cavity	86	1.69	1.22	1	1
Precious	86	3.62	1.76	4	2
Seat	84	1.67	1.38	1	1
Tombstone	86	1.92	1.55	1	1
Flavour	86	3.13	1.82	3	1
Index	86	1.55	1.23	1	1
Television	85	2.95	1.90	2	1
Cycle	86	2.43	1.76	1	1
Waitress	86	1.84	1.59	1	1
Flashlight	86	1.41	0.95	1	1
Gold	86	1.81	1.32	1	1
Reservoir	86	1.42	0.87	1	1
Hunt	86	1.56	1.04	1	1
North	86	2.19	1.85	1	1
Radiator	86	1.56	1.26	1	1
Curtains	86	1.72	1.33	1	1
Breed	86	2.00	1.56	1	1
Auctioneer	86	1.21	0.56	1	1
Diary	86	2.58	1.80	2	1
Manuscript	86	2.15	1.60	1	1
Fridge	85	2.26	1.60	1	1
Monkey	85	1.84	1.65	1	1
Hummingbird	86	1.47	0.95	1	1
Curry	86	2.15	1.55	1	1
Crisp	86	1.98	1.49	1	1

APPENDIX 13

Normality tests- (i) 10 internal state & matched neutral words (ii) 14 internal-emotional & matched neutral words

Normality Tests -assessment of suitability for parametric analysis (internal only and matched neutral words)

Total N = 85

Internal only words

Total Ratings	N =	Missing	Outliers	Z Skewness	Z Kurtosis	Kolmogorov sig	Sahpiro-Wilk sig
Internal ratings	83	2	P13 (mainly high scores)	-.1.621	-.0.449	.200	.112
Relevance rating	83	2	P13 (mainly high scores)	.0719	-.0133	.200	.596
Emotional ratings	82	3	None	.7105	.592	.200	.596

Matched neutral words

Total Ratings	N =	Missing	Outliers	Z Skewness	Z Kurtosis	Kolmogorov sig	Sahpiro-Wilk sig
Internal ratings	84	1	P46	4.588	1.736	.000	.000
Relevance rating	83	2	P13/ P36/ P55	5.978	6.224	.000	.000
Emotional ratings	82	3	P15/78/84/23/38/55/42/19	6.184	3.296	.000	.000

Normality Tests -assessment of suitability for parametric analysis (internal-emotional and matched neutral words)

Total N = 85

Internal-emotional words

Total Ratings	N =	Missing	Outliers	Z Skewness	Z Kurtosis	Kolmogorov sig	Sahpiro-Wilk sig
Internal ratings	82	3	P81 & P67	-2.75	0.882	.024	.004
Relevance rating	82	3	P13	0.289	0.45	.200	.876
Emotional ratings	82	4	None	-0.73	0.100	.200	.834

Matched neutral words

Total Ratings	N =	Missing	Outliers	Z Skewness	Z Kurtosis	Kolmogorov sig	Sahpiro-Wilk sig
Internal ratings	84	1	P15/35/55	4.38	2.09	.000	.000
Relevance rating	84	1	P13/P55	5.58	6.27	.000	.000
Emotional ratings	82	3	P15	5.49	4.48	.000	.000

APPENDIX 14

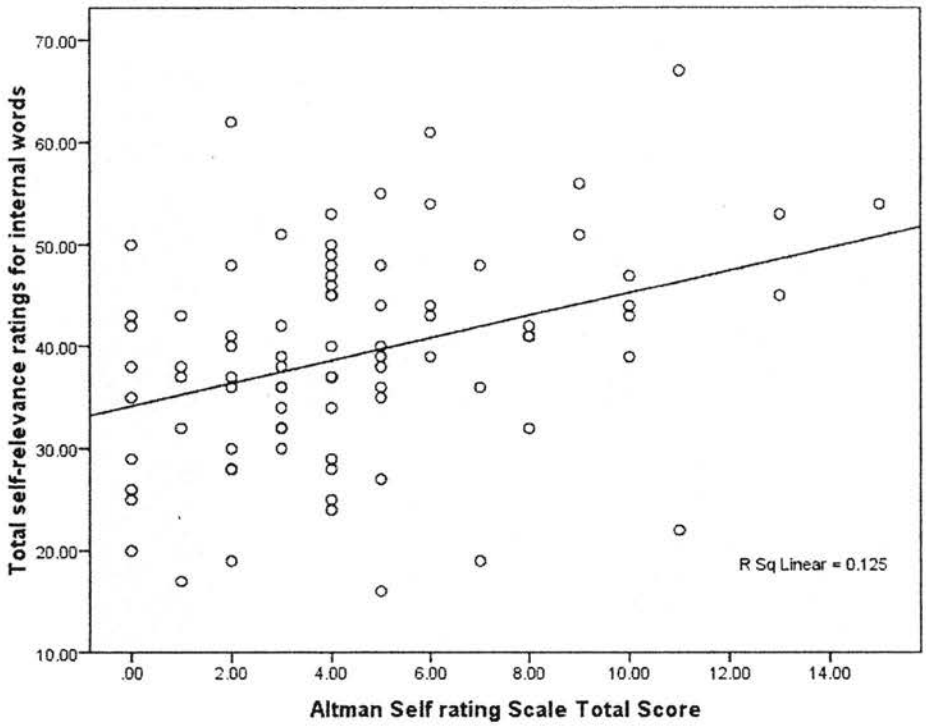
Normality tests- Questionnaires (ASRM, HADS and ISS)

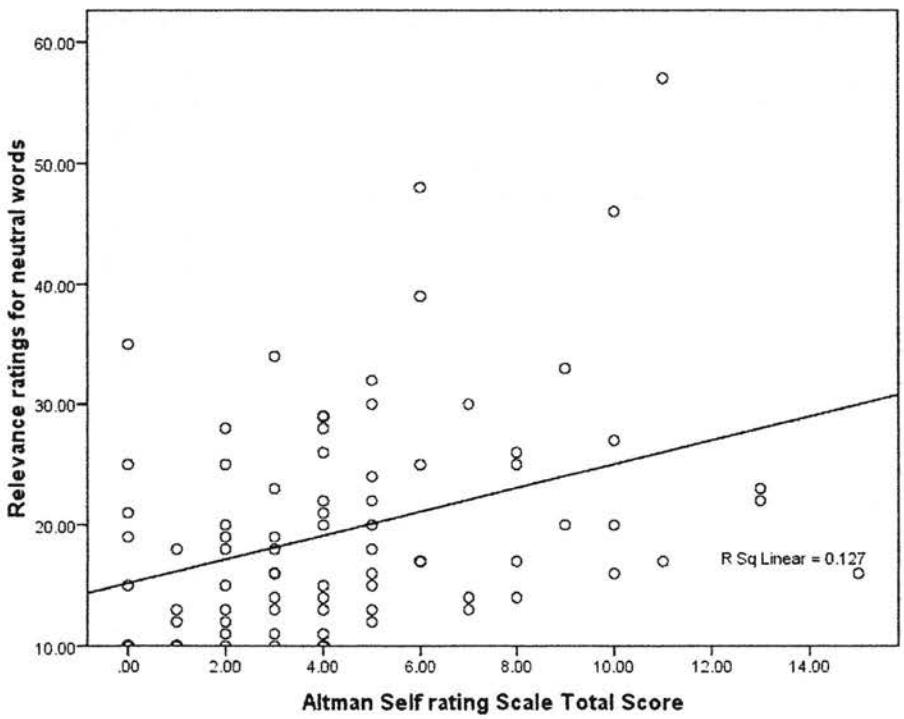
Normality Tests -assessment of suitability for parametric analysis (ASRM, HADS & ISS questionnaires)

Questionnaire	N =	Mean (SD)	Missing	Outliers	Z Skewness	Z Kurtosis	Kolmogorov sig	Shapiro
ASRMS	85	4.42 (3.33)	0	P44 P84 P16	3.712	1.472	.000	.000
HADS A	85	6.61 (3.62)	0	0	1.789	-0.997	.004	.012
HADS D	85	2.33	0	0	3.469	0.042	.000	.000
ISS ACT	85	113.86	0	0	3.277	-0.263	.001	.000
ISS WB	85	152.17 (55.98)	0	0	-.0667	-0.997	.200	.430
ISS PC	85	92.71 (82.52)	0	15	4.151	0.589	.000	.000
ISS DI	85	33.74 (35.74)	0	15/51/24/70/32	2.507	0.137	.000	.000

APPENDIX 15

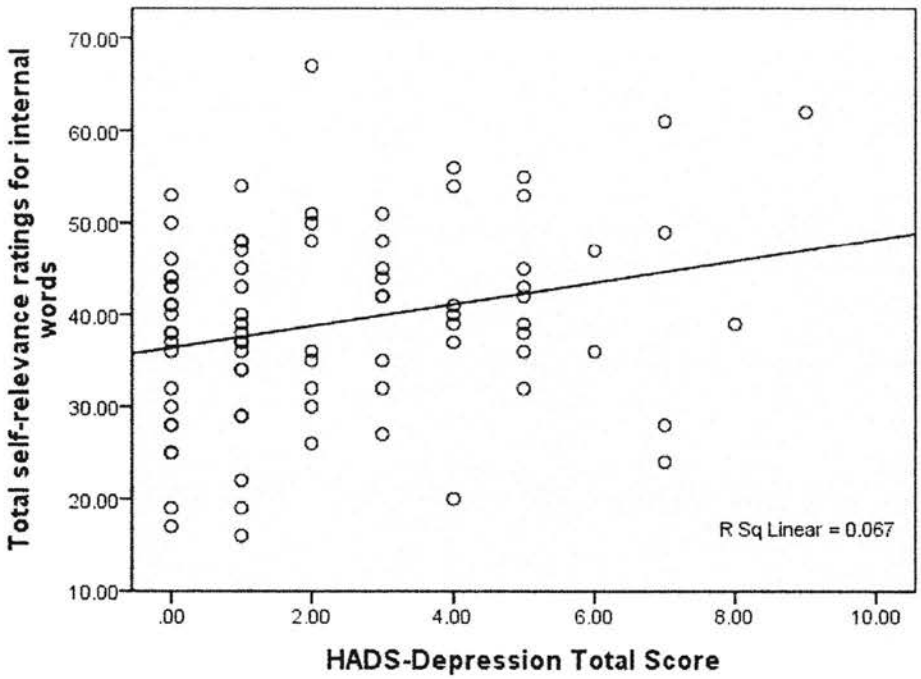
Scatterplots representing correlations between self-relevance ratings and the ASRM for internal only and matched neutral words

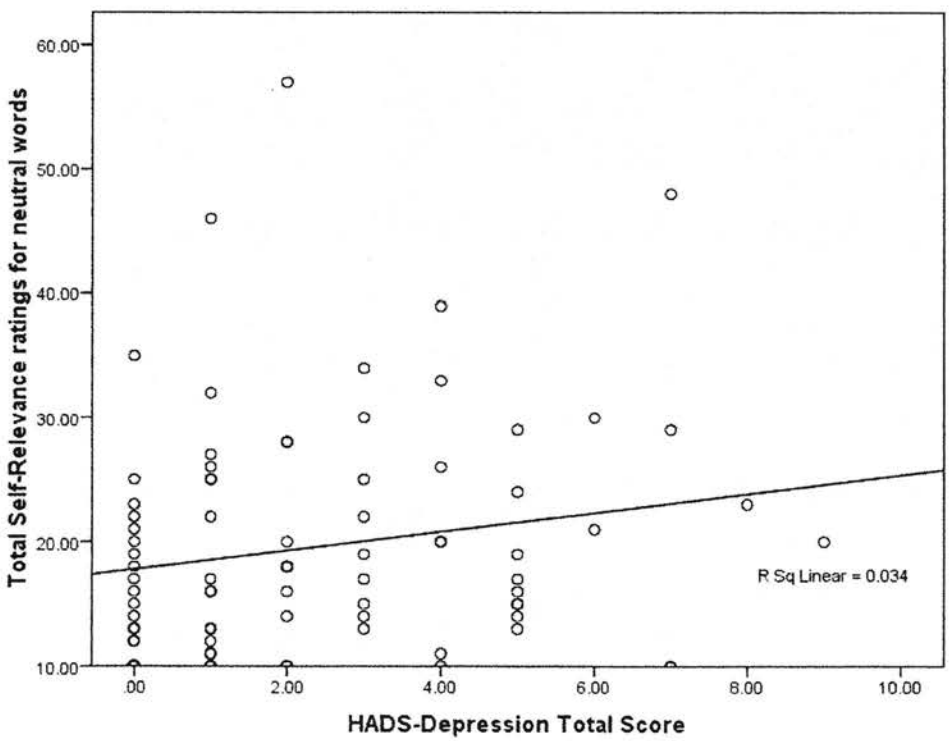

Total self-relevance ratings for internal words
70.00
60.00
50.00
40.00
30.00
20.00
10.00
.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
Altman Self rating Scale Total Score
R Sq Linear = 0.125


Relevance ratings for neutral words
60.00
50.00
40.00
30.00
20.00
10.00
.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
Altman Self rating Scale Total Score
R Sq Linear = 0.127

APPENDIX 16

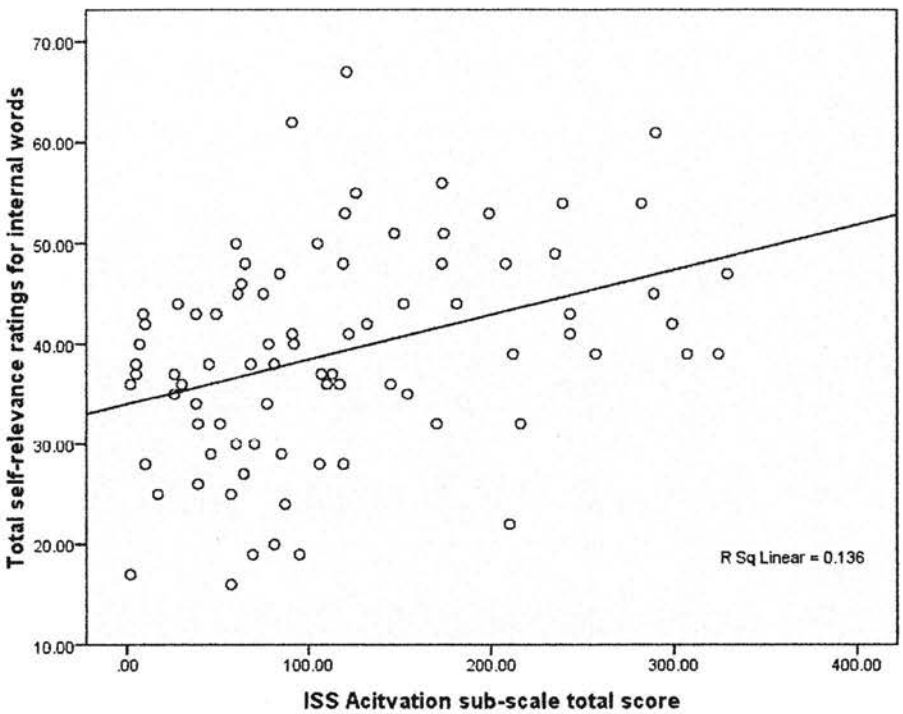
Scatterplots representing correlations between self-relevance ratings and the HADS-D for internal only and matched neutral words

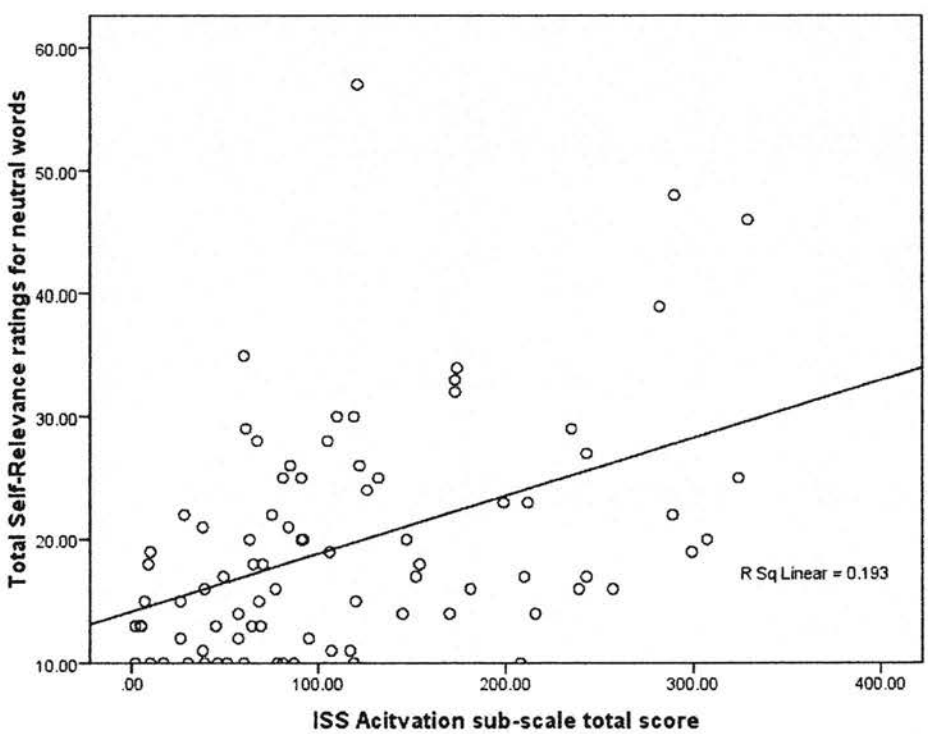

Total self-relevance ratings for internal words
70.00
60.00
50.00
40.00
30.00
20.00
10.00
.00
2.00
4.00
6.00
8.00
10.00
HADS-Depression Total Score
R Sq Linear = 0.067


Total Self-Relevance ratings for neutral words
60.00
50.00
40.00
30.00
20.00
10.00
.00
2.00
4.00
6.00
8.00
10.00
HADS-Depression Total Score
R Sq Linear = 0.034

APPENDIX 17

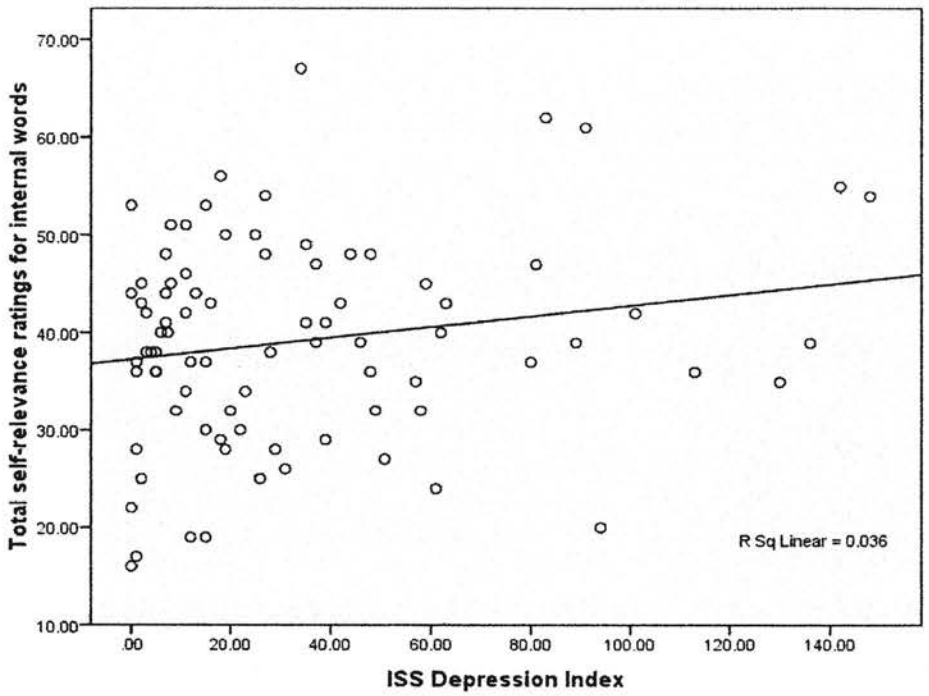
Scatterplots representing correlations between self-relevance ratings and the ISS-ACT for internal only and matched neutral words

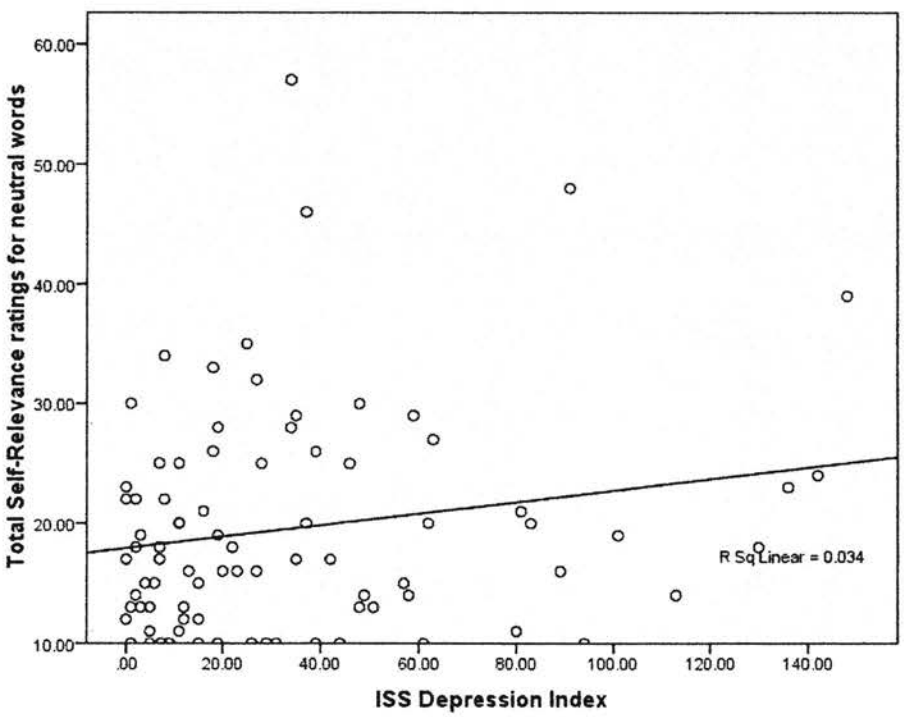

Total self-relevance ratings for internal words
70.00
60.00
50.00
40.00
30.00
20.00
10.00
.00
100.00
200.00
300.00
400.00
ISS Acitvation sub-scale total score
R Sq Linear = 0.136


Total Self-Relevance ratings for neutral words
60.00
50.00
40.00
30.00
20.00
10.00
.00
100.00
200.00
300.00
400.00
ISS Acitvation sub-scale total score
R Sq Linear = 0.193

APPENDIX 18

Scatterplots representing correlations between self-relevance ratings and the ISS-DI for internal only and matched neutral words


Total self-relevance ratings for internal words
70.00
60.00
50.00
40.00
30.00
20.00
10.00
.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
ISS Depression Index
R Sq Linear = 0.036


Total Self-Relevance ratings for neutral words
60.00
50.00
40.00
30.00
20.00
10.00
.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
ISS Depression Index
R Sq Linear = 0.034